

**NOVEL POLYPEPTIDES AND NUCLEIC ACIDS ENCODING SAME****RELATED APPLICATIONS**

5           This application claims priority to USSN 60/171,746, filed December 22, 1999, which is incorporated herein by reference.

**BACKGROUND OF THE INVENTION**

10           Mammals are able to discriminate between thousands of odor molecules. This capacity relies on a multigene family encoding 500 - 1000 olfactory receptors (ORX) See Buck et al., (1991) *Cell* **65**, 175-187. These receptors are expressed mainly in the olfactory epithelium and have been found in a number of species including mammals, birds, amphibians, and fish. See Buck et al., *supra*, (1991) *Cell* **65**, 175-187; Selbie et al., (1992) *Mol. Brain Res.* **13**, 159-163; Rouquier et al., (1998) *Nature Genet.* **18**, 243-50.; Issel-Tarver et al., (1997) *Genetics* **145**, 185-195; Sullivan et al., (1996) *Proc. Natl. Acad. Sci. USA* **93**, 884-888; Nef et al., (1992) *Proc. Natl. Acad. Sci. USA* **89**, 8948-8952; Leibovici et al., (1996) *Dev. Biol.* **175**, 118-131; Freitag et al., (1995) *Neuron* **15**, 1383-1392; Ngai et al., (1993) *Cell* **72**, 657-666.

15           All of these receptors belong to the G protein-coupled receptor (GPCR) superfamily and share features of sequence and structure, such as seven hydrophobic transmembrane domains (7TM).

20           The sense of smell plays an important role in mammalian social behavior, location of food and detection of predators. However, mammals vary in their olfactory ability. See Moulton (1967) *Am. Zool.* **7**, 421-429; Stoddart (1980) *The ecology of vertebrate olfaction* (Chapman and Hall, New York).

25           In primates, the sense of smell is greatly reduced (*i.e.*, microsmatic) with respect to other mammals such as dogs or rodents. See Moulton, *supra*; Stoddart, *supra*; Issel-Tarver, L., Rine, J. (1996) *Proc. Natl. Acad. Sci. USA* **93**, 10897-10902.

30           Various explanations for the differences in olfactory performance have been hypothesized. Differences in the anatomical structures (size, location) devoted to olfaction could partly explain these differences. For example, dogs, which have an olfactory sensitivity up to 100 times greater than humans, have on average ~100 cm<sup>2</sup> of olfactory epithelium while

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humans have only 10 cm<sup>2</sup>.

Variations in the size and diversity of the expressed ORX gene family could also account for these differences. It has recently been demonstrated that the human ORX gene repertoire is distributed in over 25 chromosomal sites. Over 70% of these ORX genes are pseudogenes, *i.e.* the sequences have accumulated deleterious mutations such as in-frame stop codons and/or indel frameshifts. *See Rouquier et al., (1998) Nature Genet. 18, 243-50.* Thus, the reduction of the sense of smell observed in primates could parallel the reduction of the number of functional ORX genes.

## SUMMARY OF THE INVENTION

The invention is based, in part, upon the discovery of novel polynucleotide sequences encoding novel polypeptides.

Accordingly, in one aspect, the invention provides an isolated nucleic acid molecule that includes the sequence an ORX nucleic acid molecule or a fragment, homolog, analog or derivative thereof. The nucleic acid can include, *e.g.*, a nucleic acid sequence encoding a polypeptide at least 80% identical to a polypeptide that includes the amino acid sequence of an ORX polypeptide. The nucleic acid can be, *e.g.*, a genomic DNA fragment, or a cDNA molecule.

Also included in the invention is a vector containing one or more of the nucleic acids described herein, and a cell containing the vectors or nucleic acids described herein.

The invention is also directed to host cells transformed with a vector comprising any of the nucleic acid molecules described above.

In another aspect, the invention includes a pharmaceutical composition that includes an ORX nucleic acid and a pharmaceutically acceptable carrier or diluent.

In a further aspect, the invention includes a substantially purified ORX polypeptide, *e.g.*, any of the ORX polypeptides encoded by an ORX nucleic acid, and fragments, homologs, analogs, and derivatives thereof. The invention also includes a pharmaceutical composition that includes an ORX polypeptide and a pharmaceutically acceptable carrier or diluent.

In still a further aspect, the invention provides an antibody that binds specifically to a ORX polypeptide. The antibody can be, *e.g.*, a monoclonal or polyclonal antibody, and

fragments, homologs, analogs, and derivatives thereof. The invention also includes a pharmaceutical composition including ORX antibody and a pharmaceutically acceptable carrier or diluent. The invention is also directed to isolated antibodies that bind to an epitope on a polypeptide encoded by any of the nucleic acid molecules described above.

5           The invention also includes kits comprising any of the pharmaceutical compositions described above.

10           The invention further provides a method for producing an ORX polypeptide by providing a cell containing an ORX nucleic acid, *e.g.*, a vector that includes an ORX nucleic acid, and culturing the cell under conditions sufficient to express the ORX polypeptide encoded by the nucleic acid. The expressed ORX polypeptide is then recovered from the cell. Preferably, the cell produces little or no endogenous ORX polypeptide. The cell can be, *e.g.*, a prokaryotic cell or eukaryotic cell.

15           The invention is also directed to methods of identifying an ORX polypeptide or nucleic acid in a sample by contacting the sample with a compound that specifically binds to the polypeptide or nucleic acid, and detecting complex formation, if present.

          The invention further provides methods of identifying a compound that modulates the activity of an ORX polypeptide by contacting an ORX polypeptide with a compound and determining whether the ORX polypeptide activity is modified.

20           The invention is also directed to compounds that modulate ORX polypeptide activity identified by contacting an ORX polypeptide with the compound and determining whether the compound modifies activity of the ORX polypeptide, binds to the ORX polypeptide, or binds to a nucleic acid molecule encoding an ORX polypeptide.

25           The invention also provides a method for assessing the olfactory acuity of a subject by providing a biological sample comprising nucleic acids from the subject, identifying a plurality of nucleic acid sequences homologous to an olfactory receptor nucleic acid sequence, determining the number of sequences containing open-reading frames, determining the number of sequences containing olfactory receptor pseudogenes, and comparing the number of open-reading frames to the number of pseudogenes to assess the olfactory acuity of the subject. In one embodiment, the invention provides a method of determining the plurality of nucleic acids using  
30           a pair of primers that selectively amplify an olfactory receptor nucleic acid sequence. In a further

embodiment, this pair of primers includes OR5B-OR3B (OR5B (TM2), 5'-  
CCCATGTA(T/C)TT(G/C/T)TT(C/T)CTC(A/G/T)(G/C)(C/T)AA(C/T)(T/C)T(G/A)TC-3'  
(SEQ ID NO: 432) and 5'-AG(A/G)C(A/T)(A/G)TAIATGAAIGG(A/G)TTCAICAT-3' (SEQ  
ID NO:433). In a still further embodiment, the ratio of the number of sequences containing  
open-reading frames to the number of sequences containing olfactory receptor pseudogenes is  
calculated and compared to a reference ratio for an organism whose olfactory acuity is known.

Unless otherwise defined, all technical and scientific terms used herein have the same  
meaning as commonly understood by one of ordinary skill in the art to which this invention  
belongs. Although methods and materials similar or equivalent to those described herein can be  
used in the practice or testing of the present invention, suitable methods and materials are  
described below. All publications, patent applications, patents, and other references mentioned  
herein are incorporated by reference in their entirety. In the case of conflict, the present  
specification, including definitions, will control. In addition, the materials, methods, and  
examples are illustrative only and not intended to be limiting.

Other features and advantages of the invention will be apparent from the following  
detailed description and claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic phylogeny tree of the primate species used in the Examples.

FIG. 2 is a comparison of the deduced protein ORX sequences obtained from the different  
primate species characterized. The dendrogram was established using the PileUp program from  
the GCG Package. Percent amino acid similarity (ASI) was determined by pairwise sequence  
comparisons using the Gap program and is indicated along the abscissa of the tree. Sequences  
obtained from the literature are indicated by an asterisk. For example, human ORX sequences  
derived from the use of the OR3B/OR5B primers and representing the main ORX families were  
selected from Rouquier et al., *Nature Genet.* (1998) 18, 243-50 and Rouquier et al. (1998) *Hum.*  
*Mol. Genet.* 7, 1337-1345. Dog (CfOLF1 and its human counterpart HsOLF1; CfOLF2) and  
chicken (COR4) sequences were selected from Issel-Tarver et al. (1997) *Genetics* 145, 185-195  
and Leibovici et al., (1996) *Dev. Biol.* 175, 118-131, respectively. ORX families (greater than  
40% ASI) are indicated by open circles and subfamilies (greater than 60% ASI) are indicated by



open squares. The main family was arbitrarily named family 1 and subdivided in two groups of subfamilies, 1-I and 1-II, which are indicated by ovals. Group 1-II further comprises subfamilies A and B. Beside each sequence name, black dots indicate sequences derived from the use of the OR3B/OR5B consensus primers, black squares those derived from the OR3.1/7.1 consensus primers, and black rectangles indicate potentially functional genes (uninterrupted ORFs). In the case of HSA 912-93 (black rectangle and double asterisk), the sequence contains only one nonsense point mutation in human, but potentially codes in other primates. See Rouquier et al. (1998) *Hum. Mol. Genet.* 7, 1337-1345. In FIG. 2, the following abbreviations are used: human, HSA; chimpanzee, PTR; gorilla, GGO; orangutan, PPY; gibbon, HLA; macaque, MSY; baboon, PPA; marmoset, CJA; squirrel-monkey, SSC and SBO; lemur, EFU and ERU; zebrafish, DRE.

## DETAILED DESCRIPTION OF THE INVENTION

Included in the invention are the novel nucleic acid sequences and their polypeptides. The sequences are collectively referred to as "ORX nucleic acids" or "ORX polynucleotides" and the corresponding encoded polypeptides are referred to as "ORX polypeptides" or "ORX proteins." Unless indicated otherwise, "ORX" is meant to refer to any of the novel sequences disclosed herein.

The ORX nucleic acids and polypeptides are described in more detail below.

### OR1

LOCUS AF127814 649 bp DNA PRI 28-FEB-2000

DEFINITION Papio hamadryas olfactory receptor (PPA13) gene, partial cds.

ACCESSION AF127814

KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Papio.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,

Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>649

/gene="PPA13"

CDS <1..>649

/gene="PPA13"

/codon\_start=2

/product="olfactory receptor"

/translation="WVDICFSTCIVPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILG

TLLLTVMAYDRFVAVCHPLHYITIMNPRLCGLLVFVTWLIGVMTSLLHISLMTHLTFC

KDFEIPHFCELTHILQLACSDTFLNSTLIYVMTGVLGVFLLGIIFSYSRIASSIRK

MSSSGGKEKALSTCGSHLSVVSFLFYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID

NO:1).

BASE COUNT 128 a 188 c 130 g 203 t

ORIGIN

1 ctgggttgac atctgtttca gcacctgcat cgtccccaag atgctggtga acatccagac

61 caagaacaaa acgatttctt acatggactg cctcaccag gtctatttct ccatgtttt

121 tcctattctg ggcacactac tctgaccgt gatggcctat gaccggttg tggccgtctg

181 ccacccctg cactatataa ccatcatgaa ccccccgcctc tgggctctc tggttttgt

241 cagtggtgctc attggtgtca tgacgtccct cctccatatt tctctgatga cacatctaac

301 ctctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacata tcctccagct

361 ggcctgctct gataccttcc tgaacagcac gttgatatat gttatgacgg gtgtgctggg

421 cgttttccc ctcttggga tcattttctc ttattcacga atcgcttcat ccataaggaa

481 gatgtctca tctgggggaa aagagaaagc actttctacc tgtggtctc acctctcgt

541 cgtttctta tttatggga caggcattgg ggtccactc acttctcggg tgactcattc

601 ttccagaac atctccgtgg cctcggtgat gtacacggtg gttaccccc (SEQ ID NO:2).

## OR2

LOCUS AF127815 642 bp DNA PRI 28-FEB-2000

DEFINITION Papio hamadryas PPA14 pseudogene, partial sequence.

ACCESSION AF127815

KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Papio.

REFERENCE 1 (bases 1 to 642)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 642)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..642

/organism="Papio hamadryas"

09747156 22100  
007221 557460

gene /db\_xref="taxon:9557"  
<1..>642  
/gene="PPA14"  
/pseudo

5 BASE COUNT 123 a 171 c 125 g 223 t  
ORIGIN

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61 tcacagcaga ctcactgtt atgtgggctg cctgattcag atgtctttt cgtaccttt  
121 cgcatgtatg gaaagtctgc tcctggctgt gatggcctat gaccggttg tggccatctg  
10 181 tcaccccta cactgcccag tcactatgaa cccacgcctt tgtggcttt tagtttggt  
241 gtctttctt cttagcctgt tggattccca gctacacaat ttgattgtg tacaacttac  
301 ctgcttcaat gatgtggaaa tctctaaatt ttctgtgac ccttctcaac ttctcaatcc  
361 tagcctgctc tgacacataa catagtcgta tattttattg gtaccatatt tggttttct  
421 cctctctcag ggatcctttt ctttactat aaaattgtt cctccattcc gagagtctgc  
15 481 tcttcaggta ggaagtataa agccttctcc acctgcagct ctcaccttc agttgtttgc  
541 ttatttatg gaacagccct tggagggtac ctgattcag ctgtctctct cccccccagg  
601 aagggtgcag cggcctcagt gatgtacatg gtggtcacc cc (SEQ ID NO:3).

### OR3

20 LOCUS AF127816 649 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA15) gene, partial cds.  
ACCESSION AF127816  
KEYWORDS .

25 SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

30 REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
35 REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

40 FEATURES Location/Qualifiers  
source 1..649  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>649  
45 /gene="PPA15"  
CDS <1..>649  
/gene="PPA15"  
/codon\_start=2  
/product="olfactory receptor"  
50 /translation="WVDICFSTCIVPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILD  
TLLLTVMAYDRFVAVCHPLHYITIMNPRLCGLLVFVTWLIGVMTSLLHISLMTHLTFC  
KDFEIPHFFCELTHILQLACSDTFLNSTLIYVMTGVLGVFPLLGIIIFSYSRIASSIRK  
MSSSGGKEKALSTCGSHLSVVSIFYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID  
NO:4).

BASE COUNT 130 a 188 c 128 g 203 t

ORIGIN

1 ctgggtgac atctgttca gcacctgcat cgtccccaag atgctggtga acatccagac  
 61 caagaacaaa acgatttctt acatggactg cctcaccag gtctatttct ccatgtttt  
 121 tcctattctg gacacactac tctgaccgt gatggcctat gaccggttg tggccgtctg  
 181 ccacccctg cactatataa ccatcatgaa ccccgccctc tgggctcc tggttttgt  
 241 cactgtgctc attgtgtca tgacatccct cctccatatt tctctgatga cacatctaac  
 301 cttctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacata tcctccagct  
 361 ggcctgctct gatacttcc tgaacagcac gttgatatat gttatgacgg gtgtgctggg  
 421 cgttttccc ctcttggga tcattttctc ttattcagca atcgcttcat ccataaggaa  
 481 gatgtctca tctgggggaa aagagaaagc actttctacc tgtgctctc acctctcgt  
 541 cgtttctta tttttggga caggcattgg ggtccacttc acttctcggg tgactcattc  
 601 ttccagaac atctccgtgg cctcggtgat gtacacggtg gttaccccc (SEQ ID NO:5).

#### OR4

LOCUS AF127817 649 bp DNA PRI 28-FEB-2000

DEFINITION Papio hamadryas olfactory receptor (PPA16) gene, partial cds.

ACCESSION AF127817

KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Papio.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>649

/gene="PPA16"

CDS <1..>649

/gene="PPA16"

/codon\_start=2

/product="olfactory receptor"

/translation="WVDICFSTCIVPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILD

TLLLTVMAYDRFVAIYHSLHYTVIMSPRLCGLLVLGSWCISVMGSLLETTLTVLRLSFC

IKMEIPHFFCDLPEVLKLACSDTFINNVVIYFATGILAVIPFTGILFSYYKIVFSVLR

ISSAGGKYKAFSTCGSHLSMVSLFYGTGLGVYLSAAIPSSRTSLVASVMYTMVTP" (SEQ ID

NO:6).

BASE COUNT 130 a 176 c 136 g 207 t

ORIGIN

1 ctgggtgac atctgttca gcacctgcat cgtccccaag atgctggtga acatccagac  
 61 caagaacaaa acgatttctt acatggactg cctcaccag gtctatttct ccatgtttt

121 tctattctg gacacactac tctgaccgt gatggcctat gaccggttg tgccatcta  
181 tcactccctg cactacacgg tcatcatgag cccccggctc tgtggactgc tggttctggg  
241 atcctgggtc atcagtgtca tgggttccct gcttgagacc ttgactgtt tggagctgtc  
301 ctctgcacg aaaatggaaa ttccacactt ttttgtgat ctctctgaag tctgaagct  
361 cgctgttct gacaccttca tcaataatgt agtgatatac ttgcaactg gcattctggc  
421 tgtattccc ttactggaa tacttttct ttaactataa attgtttct ctgtactgag  
481 gatttctca gctgggggaa agtacaaagc cttttccacc tgtggttccc accttcaat  
541 ggtcagcttg ttctatggca cgggccttgg ggtctatctc agttctgcag ctataccatc  
601 ttctaggaca agtctggtgg cctcagtgat gtacaccatg gtcaccccc (SEQ ID NO:7).

**OR5**

LOCUS AF127818 649 bp DNA PRI 28-FEB-2000  
DEFINITION *Papio hamadryas* olfactory receptor (PPA41) gene, partial cds.

ACCESSION AF127818

09747155-123400

361 ggctgtctct gataccttcc tgaacagcac gttgatatat gttatgacgg gtgtgctggg  
421 cgtttttccc ctcttggga tcattttctc ttattcacga atcgcttcat ccataaggaa  
481 gatgtectca tctgggggaa aagagaaagc actttctacc tgtggtcttc accttccgt  
541 cgtttcttta tttatggga caggcattgg ggtccacttc acttctgcgg tgactcattc  
601 ttccagaac atctccgtgg cctcgggtgat gtacacgggtg gttaccccc (SEQ ID NO:9).

## OR6

LOCUS AF127819 649 bp DNA PRI 28-FEB-2000

DEFINITION Papio hamadryas olfactory receptor (PPA42) gene, partial cds.

ACCESSION AF127819

KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>649

/gene="PPA42"

CDS <1..>649

/gene="PPA42"

/codon\_start=2

/product="olfactory receptor"

/translation="LVDFCLATNTIPKMLVSLQTRSKAISYPCCLTQMYFFHFFGIVD

SIHMMAYDRFVAICHPLHYATIMSPRLCGLLVGVPWAFSCFISLTHILLMARLVFC

GSHEVPHYFCDLTPILRLSCTDTSVNRIFILIVAGMVIATPFICILASYARILAAIMK

VPSAGGRKKAFSTCSSHLSVVALFYGTTIGVYLCSSVRTAVKEKASAVMYTAVTP" (SEQ ID

NO:10).

BASE COUNT 111 a 224 c 146 g 168 t

ORIGIN

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61 caggagcaag gccatctctt atccctgctg cctgaccag atgtacttct tccatttct  
121 cggcatcgtg gacagcatca taatcgccat gatggcttat gaccgggtcg tggccatctg  
181 ccaccgttg cactacgcca cgatcatgag cccacgcctc tgtgtctcgc tggtcggcgt  
241 ccctggggcg tttctctgct tcattctctt caccacatc ctctgatgg cccgcctcgt  
301 ttctgctggc agccacgagg tgcctcacta ctctgcgac ctactccca tctccgact  
361 ttcgtgcaca gacacatcag tgaacaggat ctcatcctc attgtggcag ggatggtgat  
421 agccacgccc ttcattgca tcttggtcct ctatgctcgc atccttgcgg ccatcatgaa  
481 ggtccctctc gcaggcggca ggaagaaagc cttctccacc tgcagctccc acctgtctgt  
541 ggtgtctctc ttctatggga ccaccattgg tgtctatctg tgcctcctc cggtccgcac

601 ggctgtgaag gagaaagctt ctgccgtgat gtacacagca gtcaccccc (SEQ ID NO:11).

## OR7

5 LOCUS AF127820 641 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas PPA43 pseudogene, partial sequence.  
ACCESSION AF127820  
KEYWORDS .  
SOURCE baboon.  
10 ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 641)  
15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 641)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
25 source 1..641  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>641  
/gene="PPA43"  
30 /pseudo  
BASE COUNT 126 a 172 c 123 g 220 t  
ORIGIN  
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61 gcatagcaga gtcactctcc acgcggactg cctggcacag atgtctttct ttgtcctttt  
35 121 tgcattgata gatgacatgc tcttgactgt gatggcctat aactgatttg tggccatctg  
181 tcacccctg cactaccag tcacatgaa tctcacttc tgtgtcttct tagttttggt  
241 gtcttttcg tcacggtgtt ggattcccag ctgcacaatt tgattgtgtt acaacttacc  
301 tgcctcaatg atgtggaat ctctaaattt ttctgtgacc ctctcaact tctcaatcct  
361 agcctgctct gacacataac atagtcgtat atttatttgg taccatattt gggtttcttc  
40 421 ctctctcagg gatccttttc tttaactata aaattgttcc ctccattccg agagtgcgct  
481 cttcaggtag gaagtataaa gccttctcca cctgcagctc tcaccttcca gttgtttgct  
541 tattttatgg aacagccctt ggagggtacc tcagttcagc tgtctctctc cccccagga  
601 aggggtgcagc ggcctcagtg atgtacatgg tggtcacccc c (SEQ ID NO:12).

## OR8

45 LOCUS AF127821 649 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA68) gene, partial cds.  
ACCESSION AF127821  
50 KEYWORDS .  
SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Papio.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
5 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
10 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
/organism="Papio hamadryas"  
15 /db\_xref="taxon:9557"  
gene <1..>649  
/gene="PPA68"  
CDS <1..>649  
/gene="PPA68"  
20 /codon\_start=2  
/product="olfactory receptor"  
/translation="FIDVCFVSTTVPKMLVNIQTQSRVITYAGCITQMCFFIFFAGLD  
IFMLTVMAYDRFVAICHPLHYVTMNPRLCGLLVLASWIMSALNSSLQSLMVLHLSFC  
ADLEIPHFCELNQVVHLACSDTFLNDMVMYLASALLGGGALSGILYSYSKIVSSIRG  
25 TSSAQGKYKAFSTCASHLSVVSIFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ ID

NO:13).  
BASE COUNT 122 a 177 c 146 g 204 t  
ORIGIN  
1 cttcatagac gtctgttttg tgccaccac tgcccgaag atgctggtga acatccagac  
30 61 acagagcaga gtcacacct atgcaggctg catcaccag atgtgctttt tcatattctt  
121 tgcgggactg gatattctta tgctgacctg gatggcctat gacaggtttg tggccatctg  
181 tcacccctg cactacacgg tcaccatgaa cccaggctc tgggactgc tggttctggc  
241 gtctggatc atgagtggcc tgaattcttc gttgcaaagc ttaatggtat tgcaccttc  
301 cttctgtgca gacttggaat tccccactt ttctgtgaa cttaatcagg tggccacct  
35 361 tgcctgttct gacaccttc ttaatgacat ggtgatgtat ttgcatctg cgctgctggg  
421 cgggtggtgc ctctctggga tcctttattc ttattctaag atcgtttct ccatacgtg  
481 aacctcgtca gctcaggga agtacaaggc attttcacc tgtgcatctc acctctcgg  
541 tgtctccta tttatggta cgctcctagg agtgacttt agttctgctg caaccgtaa  
40 601 ctcacactca agtgctgcag cctcgggtgat gtacactgtg gttaccccc (SEQ ID NO:14).

## OR9

LOCUS AF127822 649 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA72) gene, partial cds.  
45 ACCESSION AF127822  
KEYWORDS .  
SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
50 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for



reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
10 /organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>649  
/gene="PPA72"  
CDS <1..>649  
15 /gene="PPA72"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FIDICFVSTTVPKMLVNIQTQSRVITYAGCITQMCFFIFFAGLD  
20 IFMLTVMAFDRFVAICHPLHYTVTMNPKLCGLLVLASWIMNALNSSLQSLIVLRLSFC  
TDLEIPHFFCELNQVVHLACSDTFLNDMGMYMASALLGGGALSGILYSYSKILSSIRG  
TSSAQGKYKAFSTCASHLSVVSIFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ ID

NO:15).

BASE COUNT 124 a 179 c 144 g 202 t

ORIGIN

25 1 cttcatagac atctgttttg tgtccaccac tgtcccgaag atgctggtga acatccagac  
61 acagagcaga gtcacacac atgcaggctg catcaccag atgtgctttt tcatattctt  
121 tgcgggactg gatatttta tgctgaccgt gatggccttt gaccggttg tggccatctg  
181 tcacccctg cactacacgg tcacatgaa cccaagctc tgtgggctgc tgggtctggc  
241 gtctggatc atgaatgcc tgaattctc gttacaaagc ttaatagtgc tgggctttc  
30 301 cttctgcaca gacttgaaa ttcccactt tttctgtgaa cttaacagg tggccacac  
361 tgctgttct gacaccttc ttaatgacat ggggatgtat atggcatctg ctctgctggg  
421 cggtggtgcc ctctctggga tctttatc ttattctaag atccttctc ccatcgtgg  
481 aacctcgtca gctcaggga agtacaaggc atttccacc tgtgcatctc acctctcgg  
541 tgtctcttta tttatggga cgctcctagg agtgacttt agttctgctg caactcgtaa  
35 601 ctacactca agtgctgcag cctcgggtgat gtacacggtg gttaccccc (SEQ ID NO:16).

## OR10

LOCUS AF127823 649 bp DNA PRI 28-FEB-2000  
40 DEFINITION Papio hamadryas olfactory receptor (PPA79) gene, partial cds.  
ACCESSION AF127823  
KEYWORDS  
SOURCE baboon.  
ORGANISM Papio hamadryas  
45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 5 source 1..649  
 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"  
 gene <1..>649  
 /gene="PPA79"  
 10 CDS <1..>649  
 /gene="PPA79"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LVDVSYATSIVPQLLAHFLAEHKAISLQSCAAQLFFSLALGGIE  
 15 FVLLAVMAYDRYVAVCDPLRYSATMHGALCAKLAITSWVSGSINSLMHTTITFQLPMC  
 TNKFINHIFCEILAVIRLACVDTSNEVTIMVSSIVLLMTPLCLVLLSYIRIISTILK  
 IQSREGRRKAFHTCASHLTVVALCYGMAIFTYIHPHSSPSVLQEKLISLFYAILTP" (SEQ ID

NO:17).  
 BASE COUNT 135 a 185 c 133 g 196 t  
 20 ORIGIN  
 1 cctgtcgat gtctcctatg ccacaagcat agtcctcag ctgctggcac atttcttgc  
 61 agaacataaa gccatctcgt tgcagagctg tgcagcccaa ttattttct ccctggcctt  
 121 ggggtgggatt gagttgttc tctggcagt gatggcctat gaccgctatg tggctgtgtg  
 181 tgacccctg cgatactcag ccaccatgca tggagcgcta tgtgctaagt tggccatcac  
 25 241 atcctgggtc agtggatcca ttaactctct catgcatacc accatcacct ttcagctgcc  
 301 catgtgcaca aacaagtta ttaatcatat attctgtgaa attctagctg tgatcaggct  
 361 ggctgtgtg gacacctctt ccaacgaggt caccatcatg gtgtctagca ttgttctt  
 421 gatgacccc ttatgtctgg ttctttgtc ttacatccgg atcatctcca ccatctaaa  
 481 gatccagtc agagaaggaa ggaggaaagc cttccacagc tgtgccttc acctcacagt  
 30 541 gggtgccctg tgctatggca tggccattt cacttacatc catcccaact ccagtcctc  
 601 tgccttcag gagaagtgga tctctctt ttatgccatt ttgacacca (SEQ ID NO:18).

## OR11

35 LOCUS AF127824 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR12) gene, partial cds.  
 ACCESSION AF127824  
 KEYWORDS .  
 SOURCE chimpanzee.  
 40 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649

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/organism="Pan troglodytes"
/db_xref="taxon:9598"
gene      <1..>649
/ gene="PTR12"
5  CDS      <1..>649
/ gene="PTR12"
/ codon_start=2
/ product="olfactory receptor"
/ translation="FLEIGFNLVIVPKMLGTLAQTITISFLGCATQMYFFFFFGVAE
10  CFLLATVAYDRYVAICSPVIMNQRTRAKLAAASWFGFPVATVQTTWLFSPFC
RTKNVNHFFCDSPPVLRVCADTALFEIYAIVGTILVVMIPCLLILCSYTRIAAAILK
IPSAKGKNKAFSTRSSHLLVVSIFYISLSLTYFRPKSNNSPEGKKLLSLSYTMTP" (SEQ ID

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NO:19).

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BASE COUNT  132 a  193 c  129 g  195 t
15  ORIGIN

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1  tttcctggag attgcttca acctagtcac tgtgcccac atgctgggga ccttcttgc
61 ccaggacaca accatctct tcttggctg tgccactcag atgtatttct tcttcttct
121 tggagttgct gaatgcttc tcttggctac cgtggcatat gaccgctatg tgccatctg
181 cagtcccttg cactaccag tcacatgaa ccaaaggaca cgggcccacac tggtgctgc
20 241 ctctgggtc ccaggcttc ctgtagctac tgtgcagacc acatggctct tcagtttcc
301 attctgtgc accaacaagg tgaaccactt ctctgtgac agccacctg tgctgaggct
361 ggtctgtgca gacacagcac tgttgagat ctacgccatc gtcggaacca ttctgtggt
421 catgacccc tgcttctga tctgtgttc ctatactgc attgctgctg ccacctctaa
481 gatccatca gctaaaggga agaataaagc ctttctaca cgctctcac acctcctgt
25 541 tgtctctct ttctatatat cattaagcct cacatattt cggcctaaat caaataattc
601 tctgagggc aagaagctgc tctgtgtgc ctacactgtt atgactccc (SEQ ID NO:20).

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## OR12

```

30  LOCUS  AF127825  650 bp  DNA      PRI    28-FEB-2000
DEFINITION  Pan troglodytes PTR2 pseudogene, partial sequence.
ACCESSION  AF127825
KEYWORDS
SOURCE  chimpanzee.
35  ORGANISM  Pan troglodytes
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Catarrhini; Hominidae; Pan.
REFERENCE  1 (bases 1 to 650)
AUTHORS  Giorgi,D.G. and Rouquier,S.P.
40  TITLE  The olfactory gene repertoire in primates and mouse: evidence for
reduction of function in primates
JOURNAL  Unpublished
REFERENCE  2 (bases 1 to 650)
AUTHORS  Giorgi,D.G. and Rouquier,S.P.
45  TITLE  Direct Submission
JOURNAL  Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
Montpellier Cedex 5 34396, France
FEATURES
Location/Qualifiers
source      1..650
50  /organism="Pan troglodytes"
/db_xref="taxon:9598"
gene      <1..>650
/ gene="PTR2"
/pseudo

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BASE COUNT 127 a 202 c 131 g 190 t

ORIGIN

1 ctttgggac atctgcttct cctccaccac cgtccccaag atgctggcca atcacatact  
61 cgggactcag accatctcct tctgtggctg ttccacacag atgtatttcg tttcatgct  
121 tgtggacatg gacaatttcc tcttagctgt gatggcctat gaccgcttgg tcgccgtgtg  
181 ccaccctta cattacacag caaagatgac ccatcagctc tgtgccctgc tgggtgctgg  
241 attatgggtg gttccaacc tgaatgtcct tctgcacacc ctgctgatgg ctcgactctc  
301 attctgtgca gacaatgccca tcctcactt cttctcgat gtgactcccc tactgaaact  
361 ctctgtctca gacacacacc tcaatgaggt cataatcctt agtgagggtg ccctgggtcat  
421 gatcacccca tttcttggca tcttggcttc ttatatgcac atcacctgca ctgtcctgag  
481 ggtcccatcc acaaaggga ggtggtaagc cttctccacc tgtggctctc acctggctgt  
541 ggttctacct cttctatggc accatcattg ctgtgtattt taaccctctg tctcccaact  
601 cagcagagaa agacactacg gctactgtgt tgtatacagt agtgactccc (SEQ ID NO:21).

OR13

LOCUS AF127826 649 bp DNA PRI 28-FEB-2000

DEFINITION Pan troglodytes PTR3 pseudogene, partial sequence.

ACCESSION AF127826

KEYWORDS

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Pan troglodytes"

/db\_xref="taxon:9598"

gene <1..>649

/gene="PTR3"

/pseudo

BASE COUNT 146 a 166 c 121 g 216 t

ORIGIN

1 ctttgttgat ttctgttatt ccaccacagt tacacccaaa ctgctggaga acttggttgt  
61 ggaagacaga accatctcct tcacaggatg catcatgcaa ttcttcttgg cgtgtatatg  
121 tgcagtggca gaaacattca tgcctggcagt gatggcctat gattgatacg tggcagtggtg  
181 taaccctttg ctctacacag ttgtcaggtc ccagaaactc tgtcatcat tagtggcagg  
241 gccctacaca tggggataaa tctcttctct gacactcacc tatttctctt tgcattatc  
301 cttctgtggg tctaataatc tcaataattt tgcctgtgag gactctgtca tcactctgt  
361 ctctgtctct gacctctaca tcagccaaat gcttggtttt gtcattgcaa tattcaatga  
421 ggtgagcagc tggggagtca tctcactac ctatatttc atctttattg ctgtcataaa  
481 aatgccttct gctgttgggc accaaaaagc ttctctacc tgtgcttccc acctgactgc  
541 catcactatt ttccatggga ctgtcctgtt cttttattgt gtacccaact ccaaaaactc  
601 atggctcata gtcaaatgag gttctgtgtt ttatacagtc atcatcccc (SEQ ID NO:22).

**OR14**

LOCUS AF127827 651 bp DNA PRI 28-FEB-2000

DEFINITION Pan troglodytes PTR4 pseudogene, partial sequence.

ACCESSION AF127827

KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 651)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 651)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..651

/organism="Pan troglodytes"

/db\_xref="taxon:9598"

gene <1..>651

/gene="PTR4"

/pseudo

BASE COUNT 131 a 166 c 134 g 220 t

ORIGIN

1 cttgtctgac atcggttca cctccaccac ggtccccaag atgattgtgg acatccagtc

61 tcacagcaga gtcattctct atgcaggctg cctgactcag atgtctctct ttgccatttt

121 tggaggtatg gaagagagac atgctcctga gtgtgatggc ctatgaccgg ttgtagcca

181 tctgtcacct atatcgttca gccatttta acccgtgttt ctgtggcttc ctgatttgt

241 tgtcttttt tttttctca gtccttcaga ctcccagctg cacaactga ttccttaca

301 aatgacctgc tcaaggatg tggaaattcc taattcttc tgggaacctt ctcaactctc

361 ccatcttgca tgtgtgaca ccttcaccag gaacatcagt atttccctgc tgccatattt

421 ggttttctc ctatctcaca gatcattttc tctactata aaattgttc ctccatgctg

481 agtgtttcat catcagggtg gaagtataaa gccttctcca actgtgggtc tcccgtgtca

541 gttgtttgct tattttatgg gaaaggcatt ggggggtacc tgagtcaga tgtgtcatct

601 tccccagaa aggtgtcagt ggcctcagt atgtacacgg tgatcacgc c (SEQ ID NO:23).

**OR15**

LOCUS AF127828 657 bp DNA PRI 28-FEB-2000

DEFINITION Pan troglodytes PTR5 pseudogene, partial sequence.

ACCESSION AF127828

KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 657)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 657)

5 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

10 source 1..657  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>657  
/gene="PTR5"  
15 /pseudo

BASE COUNT 128 a 173 c 137 g 219 t

ORIGIN

1 cttgcctgac atcggtttca cctccagcat ggcccccaag atgattgtgg acatccagtc  
61 tcacagcaga ctcattctct aggcaggctg cctgactccg atgtccctct ttgccattt  
20 121 tggaggcatg gaagagagac atgtctctga gtgtgatggc ctattaccg ttgtggcca  
181 tctgtcacc tatatatcat tcaaccatca tgaacccgtg ttctgtggc ttctagt  
241 tgtgtcttt ttttttct cagtcttta gacgcccg tgcacaact gattgccta  
301 caaatgacct gcttcaagga tgtggaaatt cctaattct tctgggaacc ttctcaact  
361 ccccatctg catgttgcga caccctcacc aataacataa tcatgtatt cctgtctgcc  
25 421 atatttggt ttctcccat ctcggggacc ctttctctt attataagat tgttctctc  
481 attctgaggg ttcatcatc aggtgggaag tataaggcct gctccacctg tgggtctcac  
541 ctgtcagttg ttgctgatt ttatggaaga tgcgttgag ggtacctcag ttcagatgtg  
601 tcattctccc tgagatagc tgcagtggc tcagtgtgt acacgtgtg caccccc (SEQ ID NO:24).

30 **OR16**

LOCUS AF127829 657 bp DNA PRI 28-FEB-2000

DEFINITION Pan troglodytes PTR6 pseudogene, partial sequence.

ACCESSION AF127829

35 KEYWORDS

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

40 REFERENCE 1 (bases 1 to 657)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 657)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..657  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>657

/gene="PTR6"

/pseudo

BASE COUNT 133 a 171 c 131 g 222 t

ORIGIN

5 1 cttgcctgac atcagtttca cctccatcac agtccccaag atgattgtgg acatctagtc  
61 tcacagcaga gtcattgct atgcagggtg cctgactcag atgtctctct ttgccatttt  
121 tggaggcatg gaagagagac atgtcctga atgtgatggc ctatgtccgg ttgtagcca  
181 tctgtcacc tcataatcat tcagccatca tgaacccgtg ttctgtggc ttctacttt  
241 tgtgtcttt tttttttc gcggtcttt agatgccag ctgcacaaca tgattgcctt  
10 301 acaaacgacc tgcctcaagg atgtggaaat tcctaattc ttctgtgac ctctcaact  
361 accccacctt gcatgttg acaccttcac caataacac atcatgtatt tccctgctgc  
421 cctatttgtt ttcttccca tctcggggac cttttctct tactgtaaaa ttgttctc  
481 cattctgagg gtttcatcat cagggtggaa gtataaacct tctccacctg tgggtctcac  
541 ctgtcagtt ttgtctgatt ttatggaaaa ggcgttgag ggtacctcag tcagatgtg  
15 601 tcattctccc tgagaaaggc tgcagtggcc tcagtgtgt acaagatggt cactccc (SEQ ID NO:25).

## OR17

LOCUS AF127830 650 bp DNA PRI 28-FEB-2000

20 DEFINITION Pan troglodytes PTR7 pseudogene, partial sequence.

ACCESSION AF127830

KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes

25 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

35 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..650

/organism="Pan troglodytes"

40 /db\_xref="taxon:9598"

gene <1..>650

/gene="PTR7"

/pseudo

BASE COUNT 122 a 168 c 127 g 233 t

ORIGIN

45 1 cttggctgac atcggttttg cctctactac tgtccccaag atgattgtgg acatccaggc  
61 tcacagtaga ctatctctt acgtaggctg cctgactcag atgtctttt tgatccttt  
121 cgcatgatg gaaagtctgc tctgattgt gatggcctat gaccggttcg tgaccatctg  
181 tcacccccct cactaccaag tcacatgag cccacgactc tgtggtctct tagttttggt  
50 241 gtctttttt cttagcctt tggacttca gctgcacaat ttgattgtgt tacaacttac  
301 ctgcttaac gatgtagaaa tctctaatt tttctgtga ccttcttaa ctctcaacc  
361 tggcctgttc tgacacctcc attaataaca tgggtgtata tttattggt gccatatttg  
421 gttttctcc tctcttaggg atcctttct ctactataa aattgtttcc tccattctga  
481 gaggttctc ttacgggtggg aagtataaag ccttctccac ctgcagctct cactgtcag

541 ttgtttgctt attttatgga acagcccttg gagggtagct cagttcagct gtgtccctt  
601 cctccaggaa ggggtgtagt gcctcagtga tgtacatggt ggtcaccccc (SEQ ID NO:26).

## OR18

LOCUS AF127831 663 bp DNA PRI 28-FEB-2000  
DEFINITION Pan troglodytes PTR8 pseudogene, partial sequence.  
ACCESSION AF127831  
KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 663)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 663)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..663  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>663  
/gene="PTR8"  
/pseudo  
BASE COUNT 129 a 171 c 139 g 224 t  
ORIGIN  
1 ctgcctgac atcggttca cctccaccac ggtccccaag atgattgtgg acatccagtc  
61 tcacagcaga gtcatttct atgcaggctg cctgactcag atgtctctct ttgccattt  
121 tggaggcatg gaagagagac atgctcctga atgtgacggc ctatgaccgg ttgtagcca  
181 tctgtcacc tcataatcgt tcagccatct tgaacccgtg ttctgtggc ttctaggtt  
241 tttgtctt gattttttt ttttctcag tcttttagac tccagctgc acaacttgat  
301 tgcttataa atgacctgct tcaaggatgt ggaaattcct aatttcttcc gggaaccttc  
361 tcaactcccc catcttgcac gttgtgacac cttactagg aacatcaaca tgtatttct  
421 tgctgccata ttgggtttc tteccatctc ggggacctt ttcttact gtaaaattgt  
481 ttctccatt ctgagggtt catcatcagg tgggaagtat aaaccttcac cactgtggg  
541 tctcacctgt cagttgttg ctgatttat ggaacaggcg ttggagggtg cctcgggtca  
601 gatgtgcat cttccccgag aaagggtgca gtgcctcag tgatgtacac ggtggtcacc  
661 ccc (SEQ ID NO:27).

## OR19

LOCUS AF127832 677 bp DNA PRI 28-FEB-2000  
DEFINITION Pan troglodytes PTR9 pseudogene, partial sequence.  
ACCESSION AF127832  
KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;



Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 677)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 677)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..677  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>677  
/gene="PTR9"  
/pseudo  
BASE COUNT 129 a 170 c 143 g 235 t  
ORIGIN  
1 cttgactgac atcggtttca cctccatcac agtccccaag atgattgtgg acatctagtc  
61 tcacagcaga gtcactgct atgcagggtg cctgactcag atgtctctct ttgccatttt  
121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatggccgg ttgttagcca  
181 tctgtcacc tccatctgt tcagccattt tgaacccgtg ttctgtggc ttcttagatt  
241 tgtgtcctt gttttttt gttttttt caggctttta gactcccgag  
301 tgcacaactt gattgcctta caaatgacgt gtttcaagga tgtggaaatt cctaatttct  
361 tctgggaacc ttctcaactc gcccatcttg catgttgtaa caccttcacc aggaatatca  
421 acctgtatt cctgtctgcc gtatttggtt ttcttccat ctcggggacc cttttctt  
481 actgtaaaat tgttctctc attctgaagg ttcatcatc aggtgggaac tataaagcct  
541 tctccactg tgggtctcac ctgtcagttg ttgtctatt ttatggaaca ggcgttgag  
601 ggtacctcag ttcagatgtg tcatttccc ccagaaaggg tgcagtggcc tcagtgatgt  
661 acacgtggt caccccc (SEQ ID NO:28).

## OR20

LOCUS AF127833 643 bp DNA PRI 28-FEB-2000  
DEFINITION Hylobates lar HLA45 pseudogene, partial sequence.  
ACCESSION AF127833  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 643)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 643)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers

source 1..643  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>643  
 /gene="HLA45"  
 /pseudo

BASE COUNT 131 a 168 c 127 g 217 t  
 ORIGIN

1 ctgggctgac atcactttca cctcggccat ggttcccaag atgggtgtgg acatgcagtc  
 61 gcatagcaga gccatctct atgcaggctg cctgacacag atgtcttct ttgtccttt  
 121 gcatgtatag aagacatgct cctgactctg atggcctatg accgattgt ggccatctgt  
 181 caccctctgc actaccagct catcgtgaat cctcacctct gtgtcttct agttttgtg  
 241 tctttttc ttagcctgtt ggattcccag ctacacagct ggattgtgt tacaattcac  
 301 cttctcaag aatggaaatc tctaatttt tctgtgacct gtctcaact ctcaacctg  
 361 cctgttctga cagcatcatc gataacatat tatatatta gatagcccta tatttggtt  
 421 tcttccatt tcagggatcc tttgtctta gtataaaatt gtctcccca ttccgagaat  
 481 tccatcatca gatgggaagt ataaagcctt ctccacctgt ggctctcacc tggcagttgt  
 541 tgcattttat gaaacagcca ttggcgtgta cctgacttca gctgtgcat catccccag  
 601 gaatggtgtg gtggcgctag tgatgtatgc tgtggtcacc ccc (SEQ ID NO:29).

## OR21

LOCUS AF127834 648 bp DNA PRI 28-FEB-2000

DEFINITION Hylobates lar HLA46 pseudogene, partial sequence.

ACCESSION AF127834

KEYWORDS .

SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..648  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>648  
 /gene="HLA46"  
 /pseudo

BASE COUNT 131 a 170 c 143 g 204 t

ORIGIN

1 ctggctgac atctgtttca cctccaccac gatgcccaag atgttggtga acatccaggc  
 61 acagactcaa tccatcagtt acacaggctg cctcacccaa atctgctttg tcttggttt  
 121 tgttgattg gaaaatggaa ttctggatcat gatggcctat gatcgattg tggccatctg  
 181 tcaccactg aggtacaatg tcatcatgaa cccaaactct gtgggctgct gcttctgctc  
 241 tcttcatca ttagtgtctt ggacgctctg ctgcacacgt tgatggtgct acggctgacc

301 ttctgcacag acctggaaat tccccacttt ttctgtgaac tagctcatgt tctcaagctc  
 361 gcctgttctg atgtctcat taataacatc ctggtgtatt tggtagccgg cctgttaggt  
 421 gttgttctc actctgggat cattttctct tacacacgaa ttgcctctc tgcataaaa  
 481 attccattag ctggtggaaa gtataaagct tttccatct gcgggtcaca cttaatcgtc  
 5 541 gtttctgt tctatggaac agggtttggg gtgtacctta gttctggggc taccactcc  
 601 tctaggcagg gtgcaatagc atcagtgtg tataccgtgg tcaccccc (SEQ ID NO:30).

## OR22

10 LOCUS AF127835 660 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA47 pseudogene, partial sequence.  
 ACCESSION AF127835  
 KEYWORDS .  
 SOURCE common gibbon.  
 15 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..660  
 30 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>660  
 /gene="HLA47"  
 /pseudo  
 35 BASE COUNT 127 a 182 c 137 g 214 t  
 ORIGIN  
 1 ctgcctgac atcggttca ctccaccac agtccccaag attattgtgg acatcaaate  
 61 tcacagcaga gtcattctct aggcaggctg cctgactcag acctctctct ttgccatttt  
 121 tggaggcatg gaagagagac acgtcctga gtgtgatggc ctatgaccgg ttgtagcca  
 40 181 tctgtacccc tctatatcat tcggccatga tgaaccctg tttctgccc ttttagttt  
 241 tttgtcttt tttttttt tctcagtct ctagactccc agctgcacaa ctgattgcc  
 301 ttgtaacga cctgctcaa gggtagcggaa attcctaatt tttctgtga cccttctcaa  
 361 ctcccccac ttgcatgtg tgacacctc accaataaca taatcatgta tttctgtct  
 421 gccgtattg ggttcttcc catctcgggg acccttctct ctactataa aatggtttcc  
 45 481 tccattctga ggtttcatc gtcagggtgg aagtataaag cttctccac ctgtgggtct  
 541 catctgtcag ttgttctg agtttatgga agaggcgtg gaggatacct cagttcagat  
 601 gtgtctctt cccccagaaa ggttgcatg gcctcagtga tgtacacggt ggtcaccccc (SEQ ID NO:31).

## OR23

50 LOCUS AF127836 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA48) gene, partial cds.  
 ACCESSION AF127836  
 KEYWORDS .

SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

5 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

10 REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

15 FEATURES Location/Qualifiers

source 1..649

/organism="Hylobates lar"

/db\_xref="taxon:9580"

gene <1..>649

/gene="HLA48"

CDS <1..>649

/gene="HLA48"

/codon\_start=2

/product="olfactory receptor"

/translation="WVDICFGTCIIPKMLVNIQTKNKAISYMDCLTQVYFSMLFPILD

TLLLTVMAYDRFVAICHPLHYMIIMNPRLCGLLIFVIWLIGVMTSLLHISLMMHLIFC

KDFEIPHFCELTHILQLARSDTFLNSTLIYFMTGVLGVFPLLGIIFSYSRIASSIRK

MSSSGGKQKALSTCGSHLSVVSFLFYGTGIGVHFTSAVTHASQKISVASVMYTVVTP" (SEQ ID

NO:32).

30 BASE COUNT 133 a 190 c 124 g 202 t

ORIGIN

1 ctgggtgac atctgttgc gcacttgc atcccccaag atgctggtga acatccagac

61 caagaacaaa gccatctct acatggactg cctcacacag gtctatttct ccatgctttt

121 tctattctg gacacgtac tctgaccgt gatggcctat gaccggttg tggccatctg

35 181 ccacctctg cactacatga tcatcatgaa cccccgcctc tgtggcctcc tgattttgt

241 catctggctc attggtgtca tgacatccct cctccatatt tctctgatga tgcattctaat

301 cttctgtaaa gattttgaaa ttccacattt ttctcgcaa ctgacacaca tctccagct

361 ggcccgctct gataccttcc tgaacagcac gttgatatac ttatgacag gtgtgctggg

421 cgttttccc ctccttggga tcattttctc ttattcacga attgcttcat ccataaggaa

40 481 gatgtctca tctgggggaa aacaaaaagc acttccacc tgtgggtctc accttccgt

541 tgtttctta tttatggga caggcattgg ggtccacttc acttctgcag tgactcacgc

601 ttccagaaa atctccgtgg cctcggtgat gtacactgtg gtcaccccc (SEQ ID NO:33).

## OR24

45

LOCUS AF127837 649 bp DNA PRI 28-FEB-2000

DEFINITION Hylobates lar olfactory receptor (HLA5) gene, partial cds.

ACCESSION AF127837

KEYWORDS

50 SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

5 REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

10 FEATURES Location/Qualifiers

source 1..649

/organism="Hylobates lar"

/db\_xref="taxon:9580"

gene <1..>649

15 /gene="HLA5"

CDS <1..>649

/gene="HLA5"

/codon\_start=2

/product="olfactory receptor"

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KDFEIPHFFCELTHILQLACSDTFLNSTLIYFMTGVLGVFPLLGIIFSYSRIASSIRK

MSSSGGKQKALSTCGSHLSVVSFLFYGTGIGVHFTSAVTHASQKISVASVMYTVVTP" (SEQ ID

NO:34).

25 BASE COUNT 133 a 189 c 124 g 203 t

ORIGIN

1 ctgggttgac atctgtttca gcacttgcac catccccaag atgctggtga acatccagac

61 caagaacaaa gccatctect acatggactg cctcacacag gtctatttct ccatgctttt

121 tcctattctg gacacgctac tctgaccgt gatggcctat gaccggttg tggccatctg

30 181 cctccctctg cactacatga tcacatgaa cccccgcctc tgggctcc tgattttgt

241 catctggctc attggtgtca tgacatccct ctccatatt tctctgatga tgcataat

301 ctctgtgaaa gattttgaaa ttccacattt ttctgcgaa ctgacacaca tctccagct

361 ggcctgctct gataccttcc tgaacagcac gttgatatac ttatgacag gtgtgctggg

421 cgttttccc ctccctggga tcattttctc ttattcacga attgctcat ccataaggaa

35 481 gatgtctca tctgggggaa aacaaaaagc actttccacc tgtgggtctc acctctcgt

541 tgtttcttta tttatggga caggcattgg ggtccacttc actctgcag tgactcacgc

601 ttccagaaa atctcctgg cctcggtgat gtacacggtg gtcaccccc (SEQ ID NO:35).

## OR25

40

LOCUS AF127838 651 bp DNA PRI 28-FEB-2000

DEFINITION Hylobates lar HLA6 pseudogene, partial sequence.

ACCESSION AF127838

KEYWORDS

45 SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 651)

50 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 651)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..651  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>651  
 /gene="HLA6"  
 /pseudo

BASE COUNT 127 a 176 c 139 g 209 t

ORIGIN

1 ctgacctgac atcggtttca ccaccaccac ggtcccccag atgattgtgg acatccaatc  
 61 tcacagcaga gtcattctct aggcaggccg cctgactcac atgtctctct ttgccatttt  
 121 tggaggcatg gaagagagac atgtcctga gtgtgatggc ctatgacagg ttgtagcca  
 181 tctgtcaccc tctatatcat tcagccatca tgaaccggtg ttctgtggc ttctagtgtg  
 241 tctttttt ctctcagtct tttagaggcc cagctgcata acttgattgc ctgctaatag  
 301 acctgttca aggatgtgga aattcctaatt ttcctctgtg acccttctca actccgccat  
 361 ctgcatgtt gtgacatctt caccaataac ataatcatgt atttctctgc tgccgtattt  
 421 gggttccttc ccattcggg gacccttcc tctactata aaatggttcc ctccattctg  
 481 aggtttcat cgtcaggtgg gaagtataaa gccttctcca cctgtgggtc tcacctgtca  
 541 gttgttctct gagtttatgg aagaggcgtt ggagggtacc tcagttcaga tgtgtcctct  
 601 tccccagaa agtttgcagt ggcctcagtg atgtacacgg tggtcacccc c (SEQ ID NO:36).

OR26

LOCUS AF127839 644 bp DNA PRI 28-FEB-2000

DEFINITION Hylobates lar HLA7 pseudogene, partial sequence.

ACCESSION AF127839

KEYWORDS

SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 644)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 644)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..644  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>644  
 /gene="HLA7"  
 /pseudo

BASE COUNT 130 a 168 c 128 g 218 t

ORIGIN

1 ctgggctgac atcacttca cctcgccat ggtcccaag atgattgtg acatgcagtc  
61 gcatagcaga gccatctct atgcaggctg cctgacacag atgtcttct ttgtccttt  
121 tgcattgat gaagacatgc tctgactct gatggcctat gaccgattg tggccatctg  
181 tcacccctg cactaccag tcactgtgaa tctcacctc tgtgtctct tagttttgt  
241 gtctttttc cttagcctgt tggattccca gctacacagc tggattgtg ttacaatcca  
301 ccttctcaa gaatggaaat ctctaattt ttctgtgacc cgtctcaact tctcaacct  
361 gcctgttctg acagcatcat cgataacata ttatatatt agatagccct atattgggt  
421 ttctcccat ttacgggatc cttttgtct agtataaat tgtctcccc attctgagaa  
481 ttccatgctc agatgggaag tataaagcct tctccacctg tggctctcac ctggcagttg  
541 ttgcatatta tgaacaggc attggcgtg acctgactc agctgtgtca tcatcccca  
601 ggaatgggtg ggtggcgtca gtgatgatg ctgtgtcac cccc (SEQ ID NO:37).

## OR27

LOCUS AF127840 649 bp DNA PRI 28-FEB-2000  
DEFINITION Hylobates lar olfactory receptor (HLA74) gene, partial cds.  
ACCESSION AF127840  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>649  
/gene="HLA74"  
CDS <1..>649  
/gene="HLA74"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDFCYSTTITPKLLENLVVEYRTISFTGCIMQFFLVCIFVGTE  
TFMLAVMAYDRCVAVCNPLLYTVAMSQRCLSLVATSYSWGIVCFLTLTYFLLLELSFR  
GNNIINNFVCEHAAIVAVSCSDPYVSQEITLVSATFNEISSLMMIFTSYAFIFITVMK  
MPSTGGRKKAFSTCASHLTAITIFHGTLFLYCVPSKSSWLMVKVTSVFYTVFIP" (SEQ ID  
NO:38).  
BASE COUNT 142 a 157 c 129 g 221 t  
ORIGIN  
1 cttgttgat ttctgtatt ctactacgat tacacccaaa ctgctggaga acttggtgt  
61 ggaatataga actatttct tcacaggatg catcatgcaa ttctccttg tctgcatatt  
121 ttaggggaca gaaacattca tgctggcagt gatggcctat gaccgatgtg tggcggtgtg  
181 taacctctt ctctacacag ttgcaatgc ccagaggctt tgctcctgt tgggtgctac  
241 atcactctt tgggggatag tctgttctt gacacttacc tactttctac tggaattatc

301 cttcagagga aataatatca ttaataactt tgtctgtgag catgctgccca ttgttgctgt  
 361 gtcttgctct gaccctatg tgagccagga gatcacttta gttctgccca cattcaatga  
 421 aataagcagt ctgatgatga ttttcacttc ctatgctttc attttatca ctgcatgaa  
 481 gatgccttcc actggggggc gcaagaaagc gttctccacg tgtgcctccc acctgaccgc  
 5 541 cattaccatt ttccatggga ctatcctttt cctctactgt gttcctaact ccaaaagttc  
 601 atggctcatg gtcaagggtga cctctgtctt ttacacagtg tcattccc (SEQ ID NO:39).

## OR28

10 LOCUS AF127841 659 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA75 pseudogene, partial sequence.  
 ACCESSION AF127841  
 KEYWORDS .  
 SOURCE common gibbon.  
 15 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 659)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 659)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..659  
 30 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>659  
 /gene="HLA75"  
 /pseudo  
 35 BASE COUNT 123 a 178 c 143 g 215 t  
 ORIGIN  
 1 cttgcctgac atcggtttca ccaccaccac ggtccccgag atgattgtgg acatccaatc  
 61 tcacagcaga gtcattctct aggcaggccg cctgactcag atgtctctct ttgccatttt  
 121 tggaggcatg gaagagagac atgctctctga gtgtgacggc ctatgaccgg ttgttagcta  
 40 181 tctgtcaccc tetatatcat tcagccatca tggacccgtg tttctgtgac ttctagttt  
 241 tgttgtcttt ttttttctt ctcagtcttt tcgactccca gctgcacaac ttgattgcct  
 301 tgctaagac ttgctcaag gatgtggaaa ttctaattt cttctgtgac ctttctcaac  
 361 tccccatct tgcattgtgt gacagcatca ccaataacgt catcatgtat ttccctgctg  
 421 ccgtatttgg tttcctccc atctcgggga cccttttct ttgtataaa atcgtttcct  
 45 481 ccattctgag ggtttcatca tcaggtggga ggtataaagc cttctccacc tgtgggtctc  
 541 acctgtcagt tgtttgctga gtttatggaa gaggtgttgg aggttacctc agttcagggtg  
 601 tgtcatcttc cccagaaag ggtgcagtgg cctcagtgtat gtacacgggtg gtcaccccc (SEQ ID NO:40).

## OR29

50 LOCUS AF127842 662 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA8 pseudogene, partial sequence.  
 ACCESSION AF127842  
 KEYWORDS .



SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

5 REFERENCE 1 (bases 1 to 662)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

10 REFERENCE 2 (bases 1 to 662)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

15 FEATURES Location/Qualifiers  
 source 1..662  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>662  
 /gene="HLA8"  
 /pseudo

20 BASE COUNT 124 a 178 c 143 g 217 t  
 ORIGIN  
 1 gtcacctgac gtcgggttca cctccaccac ggccccgag atgattgtgg acaccattc  
 25 61 tcacagcaca gtcattctct aggcaggctg cctgactcag atgcctctct ttgccattt  
 121 tggaggcatg gaagagagac aagctcctga gtgtgatggc ctatgaccgg ttgttagcca  
 181 tctgtcacc tctatatcgt tcagccatca tgaatccgtg ttctgtggc tacctagttt  
 241 tgtgtcttt tttttttt ttcgagtcg ttagactcc cagctgcaca acttgattgc  
 301 ctgctaag acctgcttca gggatgcgga aattcctaatt ttctctgtg acccttctca  
 361 actccccat ctgcatgtt gtgacacctt caccaataac ataatcatgt tatttccctg  
 421 ctgcatatt tggtttcct cccatctcgg ggacccttt ctcttctgt aaaattgtt  
 481 cctccgttct gagggttca tcgtcaggta ggaagtataa agccttctcc acctgtgggt  
 541 ctacctgtc agttgtttgc tgagttatg gaagaggcgt tggagggtac gtcagttcag  
 601 atgtgtctt ttccccaga aagggtgcag tggcctcagt gatgtacatg atgtcaccc  
 35 661 cc (SEQ ID NO:41).

### OR30

LOCUS AF127843 662 bp DNA PRI 28-FEB-2000

40 DEFINITION Gorilla gorilla GGO1 pseudogene, partial sequence.  
 ACCESSION AF127843  
 KEYWORDS .  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla

45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 662)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

50 REFERENCE 2 (bases 1 to 662)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..662  
/organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>662  
/gene="GGO1"  
/pseudo

BASE COUNT 127 a 180 c 135 g 220 t  
ORIGIN

1 cttgactgac atcggtttca cctccaccac agtccccaag atgattgtgg acatccagtc  
61 tcacagcaga gccatctcct atgcacgctg cctgactcag atgtctctct ttgccatttt  
121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgaccgg ttgtagcca  
181 tctgtcaccc tctgtatcgt ccagccatct tgaaccctg ttctgtggc ttctagatt  
241 cgtgtcctt gttttttt tttttctc agtcttttag actcccagct gcacaacttg  
301 atgccttac aatgaacctg cttcatggat gtggaaatc ctaatttct ctgggaacct  
361 tctcaactcc ccatcttgac atgttgtag accttcacca ggaacatcaa cctgtatttc  
421 cctgtgccca tatttggttt tcttccatc tcggggaccc ttctctta ctataaaatt  
481 gtttctcca ttctgaaggt ttcatcaggt gggaagtata aaccttctcc gcctgtggtt  
541 ctacactgtc agttgtttac tgattttatg gaacaggcgt tggagggtac ctcggttcag  
601 atgtgtcatc ttccccgaga aagggtgcag tggcctcagt gatgtacacg gtggtcaccc  
661 cc (SEQ ID NO:42).

OR31

LOCUS AF127844 650 bp DNA PRI 28-FEB-2000

DEFINITION Gorilla gorilla GGO17 pseudogene, partial sequence.

ACCESSION AF127844

KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..650  
/organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>650  
/gene="GGO17"  
/pseudo

BASE COUNT 129 a 170 c 137 g 214 t

ORIGIN

1 tttgtgcac ctctgtttta cctccacgac tgtcccaaag atgttactga atatactgac

61 acagaacaaa ttcataacat atgcaggctg tctcggctag attttttt ttcactcat  
 121 ttgattgctt ggacaattta ctttgactg tgatggccta tgaccgttc gtggccatct  
 181 gtcacccctt gcactatacg gtcacatga acccccggtt ctgtggactg ctggttctgg  
 241 ggctctgggt catcagtgtc atgggttccc tgctcgagac cttgactgtt ttgaggctgt  
 301 cttctgcac caaaatggaa attccacact tttttgtga tctcttgaa gtcctgaagc  
 361 tcgctgttc tgacaccttc attaataacg tggatgata ctttcaact ggcgtcctgg  
 421 gtgtgattcc cttcactgga atattttct ctactataa aattgtttc tctactga  
 481 ggatttctc agctgggaga aagcacaagg cgtttccac ctgtgggtcc cacctctcag  
 541 tggtcacctt gttctatggc acgggctttg gggctctatc cagtctgca gccacaccat  
 601 ctctaggac aagtctgggt gcctcagtga tgtacacat ggtcaccccc (SEQ ID NO:43).

## OR32

LOCUS AF127845 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO18) gene, partial cds.  
 ACCESSION AF127845  
 KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>649  
 /gene="GGO18"  
 CDS <1..>649  
 /gene="GGO18"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFVSTTVPKMLVNIQTHNKVITYAGCITQMCFFLLFVGLD  
 NFLTVMAYDRFVAICHPLHYMVIMNPQLCGLLVLASWIVGVLNSMLQSLMVLPLPFC  
 THMEIPHFCEINQVVHLACSDTFLNDIVMYFAVALLGGGPLNGILYSYSKIVSSIRA  
 ISSAQGKYKAFSTCASHLSVVSIFYGTCLGVYLSSAATHNSHTGAAASVMYTVVTP" (SEQ ID  
 NO:44).  
 BASE COUNT 136 a 172 c 134 g 207 t  
 ORIGIN  
 1 ctctgtagac atctgttttg tctctaccac tgcctcgaag atgctggtga acatccagac  
 61 acacaacaaa gtcacacact atgcaggctg catcacccag atgtgctttt tctactctt  
 121 ttaggattg gataacttcc ttctgaccgt gatggcctat gaccggttg tggccatctg  
 181 tcacctctg cactacatgg tcattatgaa ccctcaactc tgtggactgc tggttctggc  
 241 gtctctggtc gtgggtgttc tgaattccat gttacaaagc ttaattggtg tggcactgcc  
 301 cttttgtaca cacatggaaa tccctcattt ttctgtgaa attaatcagg tggccacact

361 tgcctgttct gacaccttc ttaatgacat agtgatgat ttgcagtag cactgctggg  
 421 cgggtgtccc ctcaatggga tctgtactc ttactctaag atagtttct ccatacgtgc  
 481 aatctcatca gctcaggga agtataaggc atttccacc tgtcatctc acctctcagt  
 541 tgtctcctta tttatggta catgctagg ggtgtacctt agttctgctg caaccacaa  
 601 ttcacacaca ggtgctgcag cctcagtgat gtacactgtg gtcaccccc (SEQ ID NO:45).

### OR33

LOCUS AF127846 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO19) gene, partial cds.  
 ACCESSION AF127846  
 KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>649

/gene="GGO19"

CDS <1..>649

/gene="GGO19"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDICFISTTVPKMLVNIQARIKDISYMGCLTQVYFLMMFAGMD

TFLLAVMAYDRFVAICHPLHYTVIMNPCLCGLLVLASWFIIFWFSVLVHLLMKRLTFS

TGTEIPHFFCEPAQVLKVACSNLLNNIVLYVATALLGVFPVAGILFSYSQIVSSLMR

TSSTKGKYKAFSTCGSHLCVVSFLFYGTGLGVYLSSAVTHSSQSSSMASVMYAMVTP" (SEQ ID

NO:46).

BASE COUNT 118 a 189 c 144 g 198 t

ORIGIN

1 ctttgtggac atctgttca tctccaccac agtccccaag atgctagtga acatccaggc  
 61 acggatcaaa gacatctcct acatgggggtg cctcactcag gtgtatttt taatgatgtt  
 121 tgctggaatg gatacttcc tactggctgt gatggcctat gaccggttg tggccatctg  
 181 ccaccctctg cactacacgg tcatcatgaa cccctgcctc tgggcctcc tggttctggc  
 241 atcttggttc atcattttct ggttctcgt ggttcattt ctactgatga agaggttgac  
 301 ctctccaca ggactgaga ttccgcattt ctctgtgaa cgggtcagg tctcaagg  
 361 ggctgtctet aacacctcc tcaataacat tgtctgtat gtggccacgg cactgctggg  
 421 tgttttct gtagctggga tctctctc ctactcag attgtctct cctaatgag  
 481 aacgtctcc accaaggga agtacaagc ctttccacc tgtgcatctc acctctgtgt  
 541 ggtctcttg tctatggaa caggacttg ggtctatct agttctgctg tgaccattc  
 601 ttccagagc agtccatgg cctcagtgat gtacgcatg gtcaccccc (SEQ ID NO:47).

## OR34

LOCUS AF127847 649 bp DNA PRI 28-FEB-2000

DEFINITION Gorilla gorilla olfactory receptor (GGO2) gene, partial cds.

ACCESSION AF127847

KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>649

/gene="GGO2"

CDS <1..>649

/gene="GGO2"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDICVTSTTVPKTLSNIRTQSKVITYAGCITQMYFFILFVVLD

SLLLTVMAYDRFVAICHPLHYTVIMNSWLCGLLVLVSWIVSILCSPLQSIMALQLSFC

TELKIPHFFCELNQVVHLACSDTFIKDMMMNFTSVLLGGGCLAGIFYSYFKILCCICS

ISPAQGMNKALSTCASHLSVVSIFYCTGVGVYLSSAATHNSLSNAAASVMYTVVTS" (SEQ ID

NO:48).

BASE COUNT 146 a 166 c 129 g 208 t

ORIGIN

1 cttttagac atctgtgta cctccaccac agtcccaaag acactgtcaa acatccggac

61 acagagcaaa gtcacacct atgcagggtg catcaccag atgtactttt ttactactt

121 ttagtggtg gacagcttac tctgaccgt gatggcctat gaccggttg tggccatctg

181 tcacccctg cactacacag tcattatgaa ctctggctc tgtggactgc tggttctggt

241 gtctggatc gtgagcatcc tatgttctcc gttacaaagc ataatggcat tgcagctgtc

301 cttctgtaca gaattgaaaa tcctcattt ttctgtgaa cttaatcagg tcgtccacct

361 tgctgttct gacacttta ttaaagacat gatgatgaat ttacaagtg tgctgttggg

421 tgggggatgc ctgctggaa tattttactc ttactttaag atactttgt gcatatgtc

481 aatctacca gctcaggga tgaataaagc accttcacc tgtgcatctc acctctcagt

541 tgtctccta tttattgta caggcgtagg tgtgtacctt agttctgtg caaccataa

601 ctactctca aatgctgcag cctcagtgat gtacaccgtg gtcacctc (SEQ ID NO:49).

## OR35

LOCUS AF127848 649 bp DNA PRI 28-FEB-2000

DEFINITION Gorilla gorilla olfactory receptor (GGO3) gene, partial cds.

ACCESSION AF127848

KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>649

/gene="GGO3"

CDS <1..>649

/gene="GGO3"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDTSFISTTVPKMLVNIQARIKDISYMGCLTQVYFLMMFAGMD

TFLAVMAYDRFVAICHPLHYTVIMNPCLCGLLVLASWFIIFWFSLVHILLMKKLTFS

TGTEIPHFFCEPAQVLKVACSNTLLNNIVLYVATALLGVFPVAGILFSYSQIVSSLMR

TSSTEGKYKAFSTLWISLCVVSLFYGTGLGVYLSSAVTHSSQSSSMASVMYAVVTP" (SEQ ID

NO:50).

BASE COUNT 117 a 194 c 143 g 195 t

ORIGIN

1 ctttgtggac acctcttcca tctccaccac agtccccaag atgctagtga acatccaggc  
61 acggatcaaa gacatctcct acatgggggtg cctcactcag gtgtattttt taatgatgtt  
121 tgctggaatg gatactttcc tactggccgt gatggcctat gaccggtttg tggccatctg  
181 ccacccctcg cactacacgg tcatcatgaa ccctgcctc tgtggcctcc tggttctggc  
241 atcttggttc atcattttct ggttctccct ggttcatatt ctactgatga agaagttgac  
301 ctctccaca ggactgaga ttccgcattt ctctgtgaa ccggctcagg tcctcaaggt  
361 ggctgctct aacaccctcc tcaataacat tgtctgtat gtggccacgg cactgctggg  
421 tgtgttctct gtactgtgga tcctctctc ctactctcag attgtctct cctaatgag  
481 aacgtctcc accgagggca agtacaaagc ctttccacg ctgtggatct ccctctgtgt  
541 ggctccttg ttctatggaa caggacttgg ggtctatctg agttctgctg tgaccactc  
601 ttccagagc agctccatgg cctcagtcat gtacgccgtg gtcaccccc (SEQ ID NO:51).

OR36

LOCUS AF127849 650 bp DNA PRI 28-FEB-2000

DEFINITION Gorilla gorilla GGO4 pseudogene, partial sequence.

ACCESSION AF127849

KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..650

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>650

/gene="GGO4"

/pseudo

BASE COUNT 134 a 164 c 132 g 220 t

ORIGIN

1 cttgctgag attggttca tctcggtcgc gggtccaag atgacgtgg acatgcagtc  
61 acatagcaga gtcactcct atcggggccc cctgacacag atgtcttct ttgtccttt  
121 tgcattgat gatgacatgc tccggactct gatggcctat gaccgattg tggccatctg  
181 tcacccctg cactaccag tcatcatgaa tctcacctc tgtgtctct tagttttgt  
241 gccttttct cttagcctgt tggattcca gctgcacagc tggattgtg tacaattcac  
301 ttgctcaag aatgtggaaa tatctaatt ttatgtgat ccatctcaac ttctaaact  
361 tgactgtct gaacagtgtc atcaatagca tattcacata ttatagatg actatgttg  
421 gtttcttcc catttcaggg atcctttgt ctactataa aattgtccc tccattctaa  
481 gaattcatc gtcagatggg aagtataaag ccctctccac ctgtggctc cacctgtcag  
541 ttgttgcct atttatgga ataggcattg gcgtgtacct gactcagct gtgtcaccac  
601 caccaggaa tgggtgtgtg gcatcagtga tctacgcgtt ggtcaccgcc (SEQ ID NO:52).

### OR37

LOCUS AF127850 650 bp DNA PRI 28-FEB-2000

DEFINITION Gorilla gorilla GGO70 pseudogene, partial sequence.

ACCESSION AF127850

KEYWORDS

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..650

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/organism="Gorilla gorilla"
/db_xref="taxon:9593"
gene      <1..>650
          /gene="GGO70"
          /pseudo
5  BASE COUNT  128 a  170 c  134 g  218 t
  ORIGIN
    1 cttgcctgac atcggtttca cctccacat ggtccccaag atgattgtgg acgtccaatc
    61 tcacagcagg tcatctcct atgcaggctg cctgactcag atatctctct ttgccattt
  10  121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgaccgg ttgtagcca
    181 tctgtcacc tctatatcat tcagccatca tgaaccctg tttctgtggc ttctagatt
    241 tgctgtctt tttttcttc tttttctcag tcttttagat ggtcagctgc agaacttgat
    301 tgccttaca atgacctgct tcgaggatgt ggggaattcct aatttcctct gtgacccttc
    361 tcaactgcc catctcatat gttgtgacat cttaccaat cacataatca tgtatttccc
  15  421 tgctgccata ttgtgtttc ttccatctc ggggaccctt ctctcttacc atgtaattgt
    481 ttctccatt ctgagggtt catcatctat gggagggtga aagccttccc cactgtgag
    541 ttgttgctg atattatgga acaggcttcg gagggtacct cagttcagat gtgttatctt
    601 caacaagaaa ggctgcagtg gcctcagtga tgtacacggt ggtcacgccc (SEQ ID NO:53).

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## OR38

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LOCUS   AF127851   649 bp   DNA       PRI    28-FEB-2000
DEFINITION  Gorilla gorilla olfactory receptor (GGO71) gene, partial cds.
ACCESSION  AF127851
25  KEYWORDS
SOURCE     gorilla.
  ORGANISM  Gorilla gorilla
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
            Eutheria; Primates; Catarrhini; Hominidae; Gorilla.
30  REFERENCE  1 (bases 1 to 649)
    AUTHORS  Giorgi,D.G. and Rouquier,S.P.
    TITLE    The olfactory gene repertoire in primates and mouse: evidence for
            reduction of function in primates
    JOURNAL  Unpublished
35  REFERENCE  2 (bases 1 to 649)
    AUTHORS  Giorgi,D.G. and Rouquier,S.P.
    TITLE    Direct Submission
    JOURNAL  Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
            Montpellier Cedex 5 34396, France
40  FEATURES   Location/Qualifiers
    source    1..649
            /organism="Gorilla gorilla"
            /db_xref="taxon:9593"
    gene      <1..>649
            /gene="GGO71"
45  CDS        <1..>649
            /gene="GGO71"
            /codon_start=2
            /product="olfactory receptor"
50  /translation="FADLCFTSTTVPKMLLNILTQNKFITYAGCLGQIFFFTSFGCLD
    NLLLTVMAYDRFVAICHPLHYTVIMNPRLCGLLVLGSWCISVMGSLLETLTVLRLSFC
    TKMEIPHFCDLLEVLKLACSDTFINNVIYFATGVLGVIPFTGIFFSYKIVFSILR
    ISSAGRKHKAFSTCGSHLSVVTLFYGTGFGVYLSSAATPSSRTSLAASVMYTMVTP" (SEQ ID
    NO:54).

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BASE COUNT 130 a 171 c 136 g 212 t

ORIGIN

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1 ttttctgac ctctgttta cctccacgac tgtcccaaag atgttactga atatactgac
61 acagaacaaa ttcataacat atgcaggctg tctcggctcag atttttttt tcacttcatt
121 tggatgcctg gacaatttac tcttgactgt gatggcctat gaccgcttcg tggccatctg
181 tcacccctg cactatacgg tcatcatgaa cccccggctc tgtggactgc tggttctggg
241 gtcttggtgc atcagtgtca tgggttcctt gctcgagacc ttgactgttt tgaggctgtc
301 cttctgcacc aaaatggaaa tccacactt ttttgtgat cttctgaag tctgaagct
361 cgctgttct gacacctca ttaataacgt ggtgatatac ttgcaactg gcgtcctggg
421 tgtgattccc ttactggaa tattttctc ttactataaa attgtttct ctatactgag
481 gatttcctca gctgggagaa agcacaagc gtttccacc tgtggtccc acctctcagt
541 ggtcaccttg ttcatggca cgggcttgg ggtctatctc agttctgcag ccacaccatc
601 ttctaggaca agtctggcgg cctcagtgat gtacaccatg gtcaccccc (SEQ ID NO:55).
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OR39

LOCUS AF127852 649 bp DNA PRI 28-FEB-2000

DEFINITION Eulemur fulvus olfactory receptor (EFU35) gene, partial cds.

ACCESSION AF127852

KEYWORDS

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>649

/gene="EFU35"

CDS <1..>649

/gene="EFU35"

/codon\_start=2

/product="olfactory receptor"

/translation="LTDICLSTATVPKMLANIRTRSQSITYAACLTQMCFVLGSATLE

NFLLAVMAYDRYVAICHPLRYAVIMNLRRLCGFLILLSISIMDTLLHDLMLVRLSFC

THLEIPLFFCEVVQVIKLACSDTLINNLLIYFAAGVLGGVPLSGIIFSQTQIASSVLR

MASASGKYKAFSTCGSHLSVVSLLYGTGLGVYISSAFMHSPRTMAVASMMYTVVTP" (SEQ

ID NO:56).

BASE COUNT 123 a 176 c 148 g 202 t

ORIGIN

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1 cctcactgac atctgttta gcacagccac cgtcccaaag atgctggcaa acatccgaac
61 acggagtcag agcatcacgt atgcagcctg cctcaccag atgtgcttgg ttctgggttc
121 tgctacgttg gaaaatttc tctggcagt aatggcttat gaccgctatg tggccatctg
```

181 tcacccctctg agatagcgg tcacatgaa ccttcgtctc tgggcttct tgatccttt  
 241 gtcctgtct attagcatca tggacacct gctccacgat ctgatggctc tgcggctgtc  
 301 cttctgcaca cacctggaga taccctctt cttctgcgag gttgtgaag tcacaaagt  
 361 tgcctgtct gataccctca tcaataacct ctgatatat ttgcagctg gcgtgtggg  
 421 aggtgttct ctgtctggga tctttctc ttactcag attgcctct ctgtttgag  
 481 aatggcatca gcaagtggaa agtataaagc tttccacc tgggctctc acctcggg  
 541 tgttccttg cttacggga caggttggg ggtgtacatc agttctcgt ttatgcactc  
 601 tccaggacg atggcagtgg ctcaatgat gtacacggg gtcactccc (SEQ ID NO:57).

## OR40

LOCUS AF127853 645 bp DNA PRI 28-FEB-2000

DEFINITION Eulemur fulvus EFU36 pseudogene, partial sequence.

ACCESSION AF127853

KEYWORDS

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.

REFERENCE 1 (bases 1 to 645)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 645)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..645

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>645

/gene="EFU36"

/pseudo

BASE COUNT 118 a 189 c 138 g 200 t

ORIGIN

1 cttgctgac gtctgttca cctccaccac ggtgccaag atgttagtga acatccaggc  
 61 gcacagcaag gccatcacat acaaaggctg cctcaccag atgtgtttt tcttgattt  
 121 tgggtggcta gttgctact gacggtgatg gcctatgacc ggtcgtggc catctgtcac  
 181 cccctgcgt acatggtcat catgaacccc aggtctgtg gtcttctgt tctctttct  
 241 tgggtgatct gcttgacgta ttctctgctg caaagtctga tggtttgag ggtgtcctc  
 301 tgccaagaaa tagaaatccc ccactacttc tgtgaacttg ctcagatcct cagctcgcc  
 361 tgctctgaca ccctagtaa tgacgtcctg ctgtatttc tatctgctct gctcgggtt  
 421 attccctga ctgggacct ttattctat tccagaatta tctctccat aatgtgcatt  
 481 tctctgctg gagggagta caaagcctt tccacctgtg ggtctacct ctccgtcgtc  
 541 tctgtttct acgttacagg ccttggggtc tacctaact ctgaaacagc ccagccctcc  
 601 agaaggggtt caatagcctc ggtgatgtac accatgttca ccccc (SEQ ID NO:58).

## OR41

LOCUS AF127854 647 bp DNA PRI 28-FEB-2000

DEFINITION Eulemur fulvus EFU37 pseudogene, partial sequence.

ACCESSION AF127854

KEYWORDS

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemnridae; Eulemur.

REFERENCE 1 (bases 1 to 647)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 647)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..647

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>647

/gene="EFU37"

/pseudo

BASE COUNT 118 a 192 c 141 g 196 t

ORIGIN

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61 tcacagcaga gtcattcct ctgggggctg tctgaccag atgtctctg ctctgcttt  
121 tgtttgtg gatgatagc ttctgaccg gtcggcctg gacctgttg tggccatctg  
181 ccacccctg cactacacgg tcattcatgaa cccccactc tgggctcc tgggtctgat  
241 atctgttgc atcatgtccc tgggtgtcct ggttcacctc ctactgataa ggaggctgac  
301 attcccccagg gccacagaaa tcccacatta ctctgtgaa ctggctcaaa ttccaagt  
361 ggcccactc gagagcttca tcaataacat ctctgtgac ttgtcggctg tgtgtctggg  
421 tgtgtttccc atcacaggga tctctactc ctactctaaa attgtctct ccgtaatgag  
481 gatgtctgc actgcaggca agaagaaagc attttccacc tgtgggtctc attgtgtgg  
541 tctgtctgt ctatggaaca gggttgggg tctacctcag ctctgtctg accccttct  
601 cccagagcag cagcattgcc tcagtgtgt actcgtgtgt caccctc (SEQ ID NO:59).

## OR42

LOCUS AF127855 652 bp DNA PRI 28-FEB-2000

DEFINITION Eulemur rubriventer ERU38 pseudogene, partial sequence.

ACCESSION AF127855

KEYWORDS

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemnridae; Eulemur.

REFERENCE 1 (bases 1 to 652)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 652)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..652  
/organism="Eulemur rubriventer"  
/db\_xref="taxon:34829"  
gene <1..>652  
/gene="ERU38"  
/pseudo

BASE COUNT 124 a 191 c 136 g 201 t

ORIGIN

1 cttgttgac atctgttca cctccaccac catccccaag atgctggtga acattgacac  
61 acacagcaaa gacatctct acgtgggatg cctcactcag atgtatttt tcatggtgtt  
121 tgggtgactg gacaactcc tctgaccgt gatggcctgt gaccggttg tggccatctg  
181 tcacccctg cactatgcag tacagtcac atgaacccc gctctgtgc cctcctggtt  
241 ctgatgtctt ggttcacat gtcctggat gcctgggtc atgttctact tatactgagg  
301 ctgacctttt ccttagaaac tgaaatccca catttctct gtgacctggc tcagatgctc  
361 gaggtggccc gctctgacac cttatcaat aacatctgct tgtactgtt ggctgtgttg  
421 ctgtatgtt cctgtcacgg ggatcctcta ccctactct aaaattgtct cctccttaat  
481 gaggatgtc tccactgcag gcaagaagaa agcattttcc acctgtgggt ctcacctctc  
541 tgtgtctctc ttgtctatg gaacaggact tggggctctac ctaagtctg ctgtgacccc  
601 ttctccag agcagcgcca ttgctcagt gatgtacaca gtagtcccc cc (SEQ ID NO:60).

OR43

LOCUS AF127856 648 bp DNA PRI 28-FEB-2000  
DEFINITION Eulemur rubriventer ERU39 pseudogene, partial sequence.  
ACCESSION AF127856

KEYWORDS

SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..648  
/organism="Eulemur rubriventer"  
/db\_xref="taxon:34829"  
gene <1..>648  
/gene="ERU39"  
/pseudo

BASE COUNT 132 a 173 c 141 g 202 t

ORIGIN

1 ctttcgacac atctgttttg tgcaccac tgcacagag atgctgaatg tgcagacatg

09747155.122100

61 gagcaaagtc atatactaca caggctgcat caccagatg gacttttct tgcttttgt  
121 aggactggac aactctctcc tgaccgtgat ggctgtgac cggtttggg ccatctgtca  
181 cccctgcac tatgcagtag agtcatcatg aacccaggc tctgtgcat tctgttctg  
241 gtgtctgga tctgagtg cctgaattcc ttgtacaaa gcttaatgt gtgcagata  
5 301 acctctgta cagacttga aatccccac ttttctgtg aacttaatca gataatccac  
361 ctgcctgtt tggacacctt tctaatgac atggatgatg attggcagt gatgctgctg  
421 ggtggggggg gccttactgg gatcctttac tctactcta agatagtttc ctccgtacgt  
481 gcaatctct cggctcaggg gaagtataaa gcaattcca cctgtgcatc tcacctctcg  
10 541 gtcgtctct tattttattg tacatgccta ggggtgtacc tcagtctgc tacacacaac  
601 tcacactcca gcgaacagc ctcggtgatg tacacggtgg tcactccc (SEQ ID NO:61).

#### OR44

LOCUS AF127857 649 bp DNA PRI 28-FEB-2000  
15 DEFINITION Eulemur rubriventer olfactory receptor (ERU40) gene, partial cds.  
ACCESSION AF127857  
KEYWORDS .  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
25 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
30 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
35 /organism="Eulemur rubriventer"  
/db\_xref="taxon:34829"  
gene <1..>649  
/gene="ERU40"  
CDS <1..>649  
40 /gene="ERU40"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="LSDICFTSTTIPKMLVNLHAHSDISYRECLTQVYFFMIFAGLD  
NFLLTVMAYDRFVAICHPLHYMVIMNPRFCALLVLMSWFIMSLVALVHVLLILRLTFS  
LETEIPHFSC EVAQILKVARSDTFFNNICLYLSAVLLGVFPVMGILFSYSKIVSSLMR  
45 MSSTSAKNKAFSTCGSHLCVVSFLFYGTALGVYLSSAVTPSSQSSAIASVMYTVVTP" (SEQ ID  
NO:62).  
BASE COUNT 119 a 187 c 131 g 212 t  
ORIGIN  
50 1 cctttctgac atctgttca cctctaccac catcccaaag atgctggtga accttcacgc  
61 acacagcaaa gacatctcct acaggagtg cctcactcag gtgtatttt ttatgattt  
121 tgctggactg gataattcc tctgaccgt gatggcctat gaccggttg tgccactct  
181 ccaccctct cactcatgga tcatcatgaa tcccccttc tgtgccctcc tggttctcat  
241 gtcttggtc atcatgtctc tggttgcct ggttcatgt ctactatat tgaggctgac  
301 ttttctta gaaactgaaa tccacattt ctctgtgag gtggctcaga ttctcaaggt

361 ggccccgtct gacaccttct tcaataacat ctgcttatac ttgtcggtcg tgtgctggg  
 421 tgtgttccc gtcattggga tcctcttctc ctactctaaa attgttcat ccttaatgag  
 481 gatgtctcc acttcagcaa agaataaagc atttccacc tgtgggtctc acctctgtgt  
 541 ggtctctttg ttctatggaa ctgcacttg ggctacctc agctctgctg tgacccttc  
 601 ttccagagc agcgccattg cctcagtgt gtagcgggtg gtcaccccc (SEQ ID NO:63).

## OR45

LOCUS AF127858 648 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus EFU56 pseudogene, partial sequence.  
 ACCESSION AF127858  
 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..648  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>648  
 /gene="EFU56"  
 /pseudo  
 BASE COUNT 131 a 180 c 142 g 195 t  
 ORIGIN  
 1 cttttagac atctatatg tctctaccac ggtcccaaag atgctggtga atatcaagac  
 61 acacagcaaa gccatatcct acgcaggctg tgtcaccag atgcactttt gcataacgtt  
 121 tgagagtag gcattcttct cctgactgtg atggcctatg actggtttgg ggccatctgt  
 181 caccctctgc actatgtgct catcatgaac cccaggtctc gtgcactgct tgttctggtg  
 241 tcctggatca tgagtgtcct gaattccttg ttgcaaagct taatggtgtt gccactgccc  
 301 ttctgtgcag agttggaaat cccccagttt ttctgtgaac ttaacagat aatctcctt  
 361 gcctgttctg acaccttctc taatgacgtg gtgatgtatt tggcagctat gctactgggt  
 421 gaggggtgcc tactgggat cctttactct tactctaaga tagttcctc cgtacgtgca  
 481 atctcctcgg ctacggggaa gtataaagca tttccacct gtgcactca cctctcggtc  
 541 gtctccttat ttactgcac aagcctcggg gtgtacctcg gctctgctgc tacacacaac  
 601 tcactcca gcgcaacagc ctggtgatg tacacgggtg tcactccc (SEQ ID NO:64).

## OR46

LOCUS AF127859 643 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU57) gene, partial cds.  
 ACCESSION AF127859  
 KEYWORDS .  
 SOURCE Eulemur fulvus.

[illegible]

5      **AUTHORS**   Giorgi,D.G. and Rouquier,S.P.

JOURNAL Unpublished

10      **AUTHORS**   Giorgi,D.G. and Rouquier,S.P.

**JOURNAL** Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

15	source	1..643
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gene  $\overline{<1..>643}$

20 CDS <1..>643

25 /translation="FADICFVSTTVPEMLNVQTSKVISYTGCTQMDFLLFVGLDN  
FLLTVMAYDRFVAICHPLRYAVIMNPRLCVFLVLVSWILSVLNSLSQSLMVLRLTFCT

NO:65).

30 ORIGIN

1 ctttgagac atctgttttg tgtccaccac tgtccagag atgtctaagt tgcagacatg  
61 gagcaaagtc atatcttaca caggctgcat caccagatg gactttttct tgccttttgt  
121 aggactggac aacttctcc tgaccgtgat ggctatgac cgtttgttg ccactctgca  
181 cccctgcgc tatgcagtc tcatgaacc caggctctgt gtatttctg ttctggtgtc  
35 241 ctggatcctg agtgtcctga attccttgc acaagctta atggtgttgc ggctaaccct  
301 ctgtacagac ttggaatcc cccactttt ctgtgaactt aatcagataa tccaccttgc  
361 ctgttcggac acctttcta atgacgtggt gatgtatttg gcagtgatgc tgcctgggtgg  
421 gggatgcctt actgggatcc ttacttcta ctctaagata gtttctccg tacgtgcaat  
481 ctctcggtc caggggaaagt gtaaagcatt ttccacctgt gcatctcacc tcttggtcgt  
40 541 ctcttattt tattgtacat gcctagggtg gtacttgagt tctgtacac acaactaca  
601 ctccagcgca acagctcgg tgaatgacac ggtgtgtaact ccc (SEQ ID NO:66).

45 LOCUS AF127860 644 bp DNA PRI 28-FEB-2000  
DEFINITION Eulemur rubriventer ERU66 pseudogene, partial sequence.

## KEYWORDS

50 ORGANISM *Eulemur rubriventer*

REFERENCE 1 (bases 1 to 644)

43

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 644)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 10 source 1..644  
 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 gene <1..>644  
 15 /gene="ERU66"  
 /pseudo  
 BASE COUNT 113 a 191 c 145 g 195 t  
 ORIGIN  
 1 ctttctgac atctgtttca cttccgccac catcccaaag atgctgtgga gcatccgggc  
 61 acagagcaaa tccatcacgc gtgccggctg cctcacacag atgtactgtt tcatggcctt  
 20 121 tggacttctg gacaatctga tgctgatggt catggcctat gaccactttg tggccatctg  
 181 tcacctctg cactacacag tcatcatgaa cccagtgtc tgtgtccagg tgcttgcca  
 241 caccgggctt gtcagcatcc tgggggcctt cctcggagag tgaccgtgtt gcggcttctt  
 301 ttggtgcagt cactgaaatc ccacactatt tctgtgagct cctgaggct ctccagctct  
 361 cccactctga cccctccatc aataatgtca tattatacat tgtgacgggt tcatgggctt  
 25 421 ctttctctt gctgagattc ttttcttta ttctccaact gtttttctg tcttgaggat  
 481 ctcaacagca ggggggaagt ataaagtgtt ttctcctgt gagtctcacc tctcggttgt  
 541 ctgcctgttc tgtgggacct gcttggggtc tagctcagtt ccacatggac acacgcttct  
 601 ccgacagggg tgttgctcgc gtccataca ctgtagtcac cccc (SEQ ID NO:67).  
 30 **OR48**  
 LOCUS AF127861 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer olfactory receptor (ERU67) gene, partial cds.  
 ACCESSION AF127861  
 35 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemnridae; Eulemur.  
 40 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 45 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 50 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 gene <1..>649



CDS /gene="ERU67"  
 <1..>649  
 /gene="ERU67"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FMDICFTTVIVPKMLVNFLSETKAISYVGCLVQMYFFMALANTD  
 SYLLASMAIDRLVAICKPFHYDVVMSPRRCLLMLLGSCCTISHLHSLFRVLLMSRLSFC  
 ASHIIKHFFCDTQPVCLKSCSDTSSSQIVVMTETLAIVVTPFLCIHFSYLRIITVLA  
 IPSAAGKWKAFSTCGSHLTVVVLFYGSVIYVYFRPLSMYSVMKDRVATVMYTVVTP" (SEQ

ID NO:68).  
 BASE COUNT 119 a 200 c 141 g 189 t  
 ORIGIN  
 1 ttcatggat atctgctca caacagtcac tgtgccaag atgctggtga atttctgtc  
 61 agagacaaag gccatctct atgtgggctg tctgtccag atgtacttct tcatggccct  
 121 tgcaaacact gacagctacc tactggcctc catggctatt gaccggctgg tggccatctg  
 181 caaaccttc actatgatg tggttatgag cccacggcgt tgcctcctca tctgttggg  
 241 ttctggacc atctccacc tacactcct gttccgggtg ctactcatgt ctgcctgtc  
 301 ttctgtgcc tccacatca ttaagcactt ttctgtgat accgagcctg tgctaaagct  
 361 ttctgtctt gacacatcct ccagccagat tgtggtcatg accgagaccc tggctgtcat  
 421 cgtgaccccc ttctgtgca tcatcttctc ctatctgaga atcatcatca ctgtgctcgc  
 481 aatccctct gcagccggga agtgaagggc cttctccacc tgtggtccc acctcactgt  
 541 ggtggtcctg ttctatggca gtgtcatcta tgtgtatttc aggccctgt ccatgtactc  
 601 agtgaagaag gaccgggtag ccacagttat gtacacgga gtgacacct (SEQ ID NO:69).

# OR49

LOCUS AF127862 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU83) gene, partial cds.  
 ACCESSION AF127862  
 KEYWORDS  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>649  
 /gene="EFU83"  
 CDS <1..>649  
 /gene="EFU83"  
 /codon\_start=2  
 /product="olfactory receptor"

/translation="FSDICLVSTTVPQMLVNVQTHSKVISYAGCVTQMDFVFLVVGDL  
SFLLTVMAYDRFVVICHPLHYAVTMNPRLCGLLVLLSWIMSALSSLLESVLVWVCFC  
LDLEIPHFFCELNEIIHLACSDTFLIDMVMYFSALLLGGGSLAGILYSYSKIVSSVRA  
ISSAQGKYKAFSTCASHLAVVSLFYCTSLGVYLSSAATHNSHSSATASVMYTVVTP" (SEQ ID

NO:70).

BASE COUNT 119 a 182 c 152 g 196 t

ORIGIN

1 cttttctgac atctgcttgg tctcgaccac tgtcccacag atgctggtga atgtgcagac  
61 acacagcaaa gtcatatcct acgcaggctg cgtcaccag atggacttct ttgtactctt  
121 ttagggctg gacagcttc tcctaccgt gatggcctat gaccggttg tggctatctg  
181 ccacccactg cactacgagg tcacatgaa cccagggctc tggggctgc tgggtgctg  
241 gtcttgatc atgagtccc tgagttcct gtagaaagc ttagtggtgc tgggggtg  
301 cttctgtctg gacttggaaa tccccactt tttctgtgaa cttaatgaga taatccacct  
361 ggctgttct gacaccttc ttattgacat ggtgatgtat ttctagctc tactgtggg  
421 tgggtgttc ctggctggga tcctttactc ttactctaag atagttcct cgtacgtgc  
481 aatctctca gtcagggga agtataaagc atttccacc tgtgcatctc acctcgcggt  
541 tgtctcccta tttactgca caagcctcgg ggtgtacttg agttctgctg ctacacaaa  
601 ctcacactcc agcgcaacag cctcgggtgat gtacacggtg gtcactccc (SEQ ID NO:71).

## OR50

LOCUS AF127863 642 bp DNA PRI 28-FEB-2000

DEFINITION Eulemur rubriventer EFU84 pseudogene, partial sequence.

ACCESSION AF127863

KEYWORDS

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 642)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 642)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..642

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

gene <1..>642

/gene="EFU84"

/pseudo

BASE COUNT 130 a 180 c 138 g 194 t

ORIGIN

1 cttttagac atctgtttt tctctaccat ggtcccaaag atgctggtga acatcaagac  
61 acacagcagt catatctat gcaggctgtg tcacccagat gcactttcc ataactttg  
121 cagagtaga catcttctc ctgacgggtg tggcctatga ccggtgtgtg gccatctgtc  
181 accccctgca ctacacggcc atcatgaacc ccaggctctg tgaactgctg gttctggctt  
241 cctggtatcat aagtggccc aattcctgt tacaagtgt aaagggtgtg tggctgtcct  
301 tctgtacaaa cttggaatc cgtcacttt tctgtgaact tagatactac atcttgctg

361 ttgtgacacc tctgttcacg acgtgggtgat acatattgca gctgtgggtgc tggctgtttt  
 421 tcctcttctgct gggatccttt actcttactc tcagatagtt tcctccacac gtgcactctc  
 481 ctgagctcag gcgaagtga aagcatttc cacctgtgca gctcacctcg cggtgtgtc  
 541 tctattttac tgcacaagcc tcgggggtgta cttgagctct gctgctacac acaaccaca  
 601 ctccagcgca acagcctcgg tgatgtacat ggtggtcact cc (SEQ ID NO:72).

**OR51**

LOCUS AF127864 652 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus EFU86 pseudogene, partial sequence.  
 ACCESSION AF127864  
 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 652)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 652)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..652  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>652  
 /gene="EFU86"  
 /pseudo  
 BASE COUNT 126 a 166 c 152 g 208 t  
 ORIGIN  
 1 cttgcagac atctgttttg gtccaccac tgcctcaaag atgctgggtga atgtgcagac  
 61 acagagcaaa gtcatatcct acgcaggctg cgtcaccag atggactttt tcatactctt  
 121 tgcagggttg gatattctta tgetgatcat gatggcctat gaccggtttg gggccatctg  
 181 tcaccactg cagtacacgg tcatcatgaa cccagggctc tgtgggctgc tggttgtggt  
 241 gccctggatc ttgagtacc tgaattcctt gttacaaagc ttaatgggtg tgcactgtc  
 301 cttttgtaga cacttggaag tcctcacttt ttctgtgaac ttaatcaggt tgcacactt  
 361 gcctgttctg aaaccttctt taatgacatg gtgatgtatc tgatatctgt ggtgctgggt  
 421 ggtggttccc tggctgggac tctttattct ttctactgc agaatagttt gctccatacg  
 481 tgcaacgtcc tcagctcagg ggaagtataa agcatttccc acctgtgcat ctcactctc  
 541 agttgtctcc ttatcttctt gcacaatcct aggggtgtac ctcagctctg ctgctaccca  
 601 gaattcgtgc tccagtgcag tagccttggt ggtgtacacg gtggtcactc cc (SEQ ID NO:73).

**OR52**

LOCUS AF127865 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU87) gene, partial cds.  
 ACCESSION AF127865  
 KEYWORDS .  
 SOURCE Eulemur fulvus.

ORGANISM *Eulemur fulvus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 649)

5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

10 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

15 source 1..649  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>649  
 /gene="EFU87"  
 20 CDS <1..>649  
 /gene="EFU87"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFTSTTIPKMLVNIETHSKDISYMGCLTQMYFFMIFAGLD  
 25 NLLTVMAYDRFVAICHPLHYTVIMSPRFCALLVLISWFIMTLVALVHVLLILRLTFS  
 LETEIPHFCDLAQILEVAHSDTLINNICYMLSTVLLGVFPVTGILFSYSKIVSSLMR  
 MSSTAGKKKAFSTCGSHLSVVCLFCGTGVGVYLSSAVTPSSQSSSIASVMFTVVTP" (SEQ ID

NO:74).

BASE COUNT 125 a 187 c 134 g 203 t

ORIGIN

1 cttgttgac atctgttca cctccaccac catccccaag atgctggtga acattgaaac  
 61 acacagcaaa gacatctct acatgggatg cctcactcag atgtatttt tcatgatttt  
 121 tgctggactg gataatttc tctgactgt gatggcctat gaccggttg tggccatctg  
 181 ccaccctta cactacacgg tcatcatgag tccccgcttc tgtgccctcc tggttctcat  
 35 241 atcttggttc atcatgaccg tggttgccct ggttcagtga ctactgatat tgaggctgac  
 301 cttctcttta gaaactgaaa tccacattt cttctgtgac ctggctcaga ttctcgaggt  
 361 ggccactct gataccctca tcaataacat ctgcatgtac ttgtcactg tttgctggg  
 421 cgtgttctct gtcacgggga tctcttctc ctactctaaa atgtctcct ccttaatgag  
 481 gatgtcctcc actgcaggca agaagaaagc atttccacc tgtgggtctc acctctctgt  
 40 541 ggtctgcttg ttctcggaag caggagtgg ggtctatctc agttctgctg tgacccttc  
 601 ttccagagc agcagcattg cctcagtgat gttcacggtg gtcaccccc (SEQ ID NO:75).

## OR53

45 LOCUS AF127866 646 bp DNA PRI 28-FEB-2000

DEFINITION *Macaca sylvanus* MSY1 pseudogene, partial sequence.

ACCESSION AF127866

KEYWORDS

SOURCE Barbary ape.

50 ORGANISM *Macaca sylvanus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.

REFERENCE 1 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..646  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>646  
 /gene="MSY1"  
 /pseudo

BASE COUNT 115 a 186 c 144 g 201 t  
 ORIGIN

1 cttgttgac atctgttta tctccaccac cgtccccagg atgctgatga acatccaggc  
 61 atggagcaaa gacatctcct acgtgggggtg cctcactcag gtgtatttt taatgatgtt  
 121 tgctggaatg gatactttcc tactggccat gatggcctat gaccggtttg tggccatctg  
 181 ccaccccctg cactacacgg tcatcatgaa cccctgcctc tgtggcctcc tggttctggc  
 241 atctgatgc atcattttat gggctcctt agttcatatt ctactgatga agagtttgat  
 301 ctccataggc actgagatgc cgcatttctt ctgtgaactg gctcagggtcc tcaagggtggc  
 361 cgcctctgat actctcctcg ttaacattgt ctgtatgtg gccacagcac tgctgggtgt  
 421 gcttctctga gctggggtcc tcttctccta ctctcagatc gtctcctcct taatgaggat  
 481 gtctccacc gaggggcaagt gcaaagcctt ttccacctgt gggctccacc tctgtgtggt  
 541 tctctgttc tatggaacag gacttggggt ctatctcagt tctgctgtga cccattcttc  
 601 ccagagcagc tccatggcct cagtgatgta caccatggtc accccc (SEQ ID NO:76).

OR54

LOCUS AF127867 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Macaca sylvanus olfactory receptor (MSY12) gene, partial cds.  
 ACCESSION AF127867  
 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.

REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Macaca sylvanus"

/db\_xref="taxon:9546"  
 gene <1..>649  
 /gene="MSY12"  
 CDS <1..>649  
 /gene="MSY12"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDVCFVSTTVPKMLVNIQTQNKVITYAGCISQMCFFIFFAGLD  
 IFMLTVMAYDRFVAICHPLHYVTMNPRLCGLLVLASWIMSALNSSLQSLMVLHLSFC  
 ADLEIPHFFCELNQVIHLTCSDTFLNDMVMYLSAVLLGGGCLIGILYSYSKIVSSIHA  
 ISSVQKGKYKAFSTCASHLSVVSIFYCTILGVYLSSAATHSSHASAAVSVMYTVVTP" (SEQ ID

NO:77).

BASE COUNT 132 a 173 c 138 g 206 t

ORIGIN

1 ctctgtagac gtctgttttg tgtccaccac tgtcccggaag atgctggtga acatccagac  
 61 acagaacaaa gtcacacact atgcaggctg catcagccag atgtgctttt tcatattctt  
 121 tgcaggattg gacatcttta tctgaccgt gatggcctac gacaggtttg tggccatctg  
 181 tcacccctg cactacacgg tcaccatgaa ccccgaggctc tgtggactgc tggttctggc  
 241 gtcttgatc atgagtgcgc tgaattcttc attgcaaagc ttaatggat tgcacctttc  
 301 ctctgtgca gacttggaaa tccccactt ttctgtgaa cttaatcagg tcatccacct  
 361 tactgttct gacacttttc ttaatgacat ggtgatgtat ttgcagctg tgctgctggg  
 421 tgggggatgt ctcatggga tcctttactc ttactctaag atcgtctcct ctatacatgc  
 481 aatctcatca gtcaggggga agtacaaggc atttccacc tgtgcatctc acctctcggt  
 541 tgtctcctta tttattgta caatcctagg tgtgtacctt agttctgctg caaccacag  
 601 ctcacacgca agtgctgcag tctcggtgat gtacactgtg gttaccccc (SEQ ID NO:78).

## OR55

LOCUS AF127868 649 bp DNA PRI 28-FEB-2000

DEFINITION *Macaca sylvanus* olfactory receptor (MSY16) gene, partial cds.

ACCESSION AF127868

KEYWORDS

SOURCE Barbary ape.

ORGANISM *Macaca sylvanus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
*Macaca*.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>649

/gene="MSY16"

CDS <1..>649

/gene="MSY16"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="LADIGFTSTTVPKMLVNIQAQSNAISYAGCISQMYFFMVFGGID  
5 TFLTVMAYDRYVAICHPLYYPVIMNPRLCGLLVLSWFLSLSYSLIQSLLMLQLSFC  
TSWVIQHFYCELAQALTLACSDTHINYILLYVVTGLLGFVPFSGILFSYTQIVSSILR  
ISSTDGKHKAFSNCGSHLSVVFLFYGTGLGVYLSSNASSSSWRGMVASVMYTVVTP" (SEQ ID

NO:79).

BASE COUNT 115 a 195 c 140 g 199 t

10 ORIGIN

1 cttggtgac atcggttca cctccaccac agtccccaag atgctggtga acatccaggc  
61 gcagagcaat gccatcagct atgcaggctg catctcccag atgtatttt tcatggtttt  
121 tggaggcata gacacatttc tctcaccgt gatggcctat gaccggatg tggccatctg  
181 tcacccctg tactaccctg tcattatgaa ccccgccctc tgggctgc tggttctgt  
15 241 gtctggttc ctcagctgt cactaccct gatccagagt ctgtgatgc tgcagttgc  
301 ctttgcacc agttgggtca ttcagcatt ttactgcgag ctgctcagg cctcaccgt  
361 tgctgctca gacacacaca tcaattacat cctgctctac gtggtgaccg gcctctggg  
421 ttctgccc ttctcaggaa tcttttctc ctacaccaa attgtctct ccatcctgag  
481 aatctatcc acagatggga aacacaaagc cttttctaac tgcggatctc atctgtctgt  
20 541 gggttttta ttctatggga caggccttg tgtgtatct agttccaatg catcgtctc  
601 ttctggcgg gccatggtg cctcggctat gtacactgtg gtcaccccc (SEQ ID NO:80).

## OR56

25 LOCUS AF127869 647 bp DNA PRI 28-FEB-2000

DEFINITION Macaca sylvanus MSY2 pseudogene, partial sequence.

ACCESSION AF127869

KEYWORDS

SOURCE Barbary ape.

30 ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Macaca.

REFERENCE 1 (bases 1 to 647)

35 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 647)

40 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

45 source 1..647

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>647

/gene="MSY2"

/pseudo

50 BASE COUNT 131 a 173 c 137 g 206 t

ORIGIN

1 cttcgtagac gtctgttttg tgtccaccac tgtcccgaag atgctggtga acatccagac  
61 acagaacaaa gtcacacct atgcaggctg catcagccag atgtgctttt tcatattctt

121 tgcaggattg gacaccttta tgctgaccgt gatggcctac gacaggtttg tggccatctg  
 181 tcacctctg cactacacgg tcaccatgaa cccaggtctc tgggactgc tggttctggc  
 241 gtctgatca tgagtgcctt gaattcttca ttgcaaagct taatggtatt gcaccttcc  
 301 ttctgtgcag acttggaat tccccacttt ttctgtgaac ttaacaggt catccacct  
 361 acctgttctg acacttttct taatgacatg gtgatgtatt tgcagctgt gctgctgggt  
 421 gggggatgct cattgggat cctttactct tactctaaga tcgtctctc tatacttgca  
 481 atctcatcag ttcaggggaa gtacaaggca tttccacct gtgcatctca cctctcggtt  
 541 gtctccttat ttattgtaca atcctagggtg tgtaccttag ttctgctgca acccacagct  
 601 cacacgaag tgctgcagtc tcggtgatgt acactgtgtg taccccc (SEQ ID NO:81).

# OR57

LOCUS AF127870 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Macaca sylvanus olfactory receptor (MSY4) gene, partial cds.

ACCESSION AF127870

KEYWORDS .

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Macaca.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>649

/gene="MSY4"

CDS <1..>649

/gene="MSY4"

/codon\_start=2

/product="olfactory receptor"

/translation="FIDICFVSTTVPKMMVNIQTQSRVITYAGCITQMCFFIFFVGLD

IFMLTVMAFDRFVAICHPLHYTVTMNPRLSGLLVLASWIMSALNSSLQSLIVLRLSFC

TDLEIPHFCELNQVVHLACSDTFLNDMVMYLASALLGCGPLSGILYSYSKIVSSIRG

ISSAQGKYRAFSTCASHLSVVSIFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ ID

NO:82).

BASE COUNT 125 a 179 c 142 g 203 t

ORIGIN

1 cttcatagac atctgttttg tgtccaccac tgtcccgaag atgatggatga acatccagac  
 61 acagagcaga gtcacacct atgcaggctg catcaccag atgtgctttt tcattattct  
 121 tgtgggactg gatattctta tgctgaccgt gatggccttt gaccggtttg tggccatctg  
 181 tcacccctg cactacacgg tcaccatgaa cccaggtctc agtgggctgc tggttctggc  
 241 gtcttgatc atgagtgcct tgaattctc gttacaaagc ttaatagtgc tgcggcttcc  
 301 cttctgcaca gacttggaaa tccccactt ttctgtgaa cttaatcagg tggccacct



361 tgccgtgtct gacaccttc ttaatgacat ggtgatgtat ttggcatctg cactgctggg  
 421 ctgtggtecc ctctctggga tcctttatc ttattctaag atcgttcct ccatacgtgg  
 481 aatctcatca gctcaggga agtacaggc atttccacc tgtgcattc acctctcagt  
 541 tgtctccta tttatggta cgctcctagg agtgtactt agttctgctg caaccgtaa  
 601 ctcacactca agtgctgcag cctcgggtgat gtacaccgtg gttaccccc (SEQ ID NO:83).

## OR58

LOCUS AF127871 646 bp DNA PRI 28-FEB-2000  
 DEFINITION Macaca sylvanus olfactory receptor (MSY6) gene, partial cds.  
 ACCESSION AF127871  
 KEYWORDS

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.

REFERENCE 1 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..646

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>646

/gene="MSY6"

CDS <1..>646

/gene="MSY6"

/codon\_start=2

/product="olfactory receptor"

/translation="FTDLFFVTNTIPKMLVNLQSQNKAI SYAGCLTQLYFLVSLVALD

NLILAVMAYDRYVAICCP LHYTTAMSPKLCILL LSLCWVLSVLYGLIHTFLMTTVTFC

GSRKIHYIFCEMYVLLRLACSDTQINHTVLIATGCFIFLIPFGFMIISYVLIVRAILR

IPSVSKKYKAFSTCASHLGVVSLFYGTLRMVYLKPLHTYSVKDSVATVMYAVVTP" (SEQ ID

NO:84).

BASE COUNT 134 a 196 c 126 g 190 t

ORIGIN

1 cttcactgac ctctctcttg tcaccaacac aatccccaag atgctggatga acctccagtc  
 61 ccagaacaaa gccatctcct atgcagggtg tctgacacag ctctacttcc tggctcctt  
 121 ggtggccctg gacaacctca tcctggctgt gatggcgtat gaccgctatg tggccatctg  
 181 ctgccccctc cactacacca cagccatgag ccctaagctc tgtattctac tccttctctt  
 241 gtgttggtgc ttatctgtgc tctatggcct catacacacc ttctcatga ccacgggtgac  
 301 ctctgtggg tcacgaaaaa tccactacat ctctgtgtgag atgtatgtat tgcagaggt  
 361 ggcattgcc gacactcaga ttaacacac agtgctgatt gccacaggct gctttatctt  
 421 cctcattccc ttggattca tgatcattc ctatgtgtg attgtcagag ccattcctcag  
 481 aataacctca gtctctaaga aatacaaac ctctccact tgtgcctccc atttggtgtg  
 541 agtctccctc ttctatggga cacttcgtat ggtatactg aagcccctcc atacctactc

601 tgtgaaggac tcagtagcca cagtgatgta tgcggtgggtg acaccc (SEQ ID NO:85).

## OR59

5 LOCUS AF127872 649 bp DNA PRI 28-FEB-2000  
DEFINITION Macaca sylvanus olfactory receptor (MSY7) gene, partial cds.  
ACCESSION AF127872  
KEYWORDS .  
SOURCE Barbary ape.  
10 ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
REFERENCE 1 (bases 1 to 649)  
15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Macaca sylvanus"  
/db\_xref="taxon:9546"  
gene <1..>649  
/gene="MSY7"  
30 CDS <1..>649  
/gene="MSY7"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="WVDICFSICIIIPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILD  
35 TLLLTVMAYDRFVAVCHPLHYVTIMNPRLCGLLVFVTWLIGVMTPLLHISLLTHLTFC  
KDFEIPHFCELTHILQLACSDTFLNSTLIYVMTGVLGVFPLLGIIFSYSRIASSIRK  
MSSSGGKEKALSTCGSHLSIVSLFYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID  
NO:86).  
BASE COUNT 129 a 190 c 127 g 203 t  
40 ORIGIN  
1 ctgggttgac atctgtttca gcatttgcac catccccaag atgctgggtga acatccagac  
61 caagaacaaa accatctctt acatggactg cctcaccag gtctatttct ccatgtttt  
121 tctattctg gacacgtac tctgaccgt gatggcttat gaccggttg tggccgtctg  
181 ccacccctg cactatgtaa ccatcatgaa cccccgcctc tgcggcctcc tggttttgt  
45 241 cagtggtgctc attggtgtca tgacaccct cctccatatt tctctgtga cgcattctaac  
301 cttctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacaca tctccagct  
361 ggctgtctct gataccttc tgaacagcac gttgatata gttatgacag gtgtgctggg  
421 cgttttccc ctcttggga tcattttctc ttattcacga atcgttcat cctaaggaa  
481 gatgtctca tctgggggaa aagagaaagc actttctacc tgtgctctc accttccat  
50 541 cgtttctta tttatggga caggcattgg ggtccattc acttctcgg tgactcatc  
601 ttccagaac atctccgtg cctcgggtg gtacacggtg gttacccc (SEQ ID NO:87).

**OR60**

LOCUS AF127873 645 bp DNA PRI 28-FEB-2000  
 DEFINITION *Macaca sylvanus* MSY8 pseudogene, partial sequence.  
 5 ACCESSION AF127873  
 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM *Macaca sylvanus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 10 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 15 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 20 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..645  
 /organism="Macaca sylvanus"  
 25 /db\_xref="taxon:9546"  
 gene <1..>645  
 /gene="MSY8"  
 /pseudo  
 BASE COUNT 117 a 185 c 142 g 201 t  
 30 ORIGIN  
 1 cttgttgac atctgttta tctccaccac cgtccccagg atgctgatga acatccaggc  
 61 atggagcaaa gacatctcct acgtgggggtg cctcactcag gtgtattttt taatgatgtt  
 121 tgctggaatg gatactttcc tactggccat gatggcctat gaccggtttg tggccatctg  
 181 ccacccctg cactacacgg tcacatgaa cccctgcctc tgtggcatcc tggttctggc  
 35 241 atcttgattc atcattttat gggctcctc agttcatatt ctactgatga agagtttgat  
 301 ctccataggc actgagattc cgcatttctt ctgtgaactg gctcagggtcc tcaagggtgcc  
 361 cgctctgata ctctcctcgt taacattgtc ttgtatgtgg ccacagcact gctgggtgtg  
 421 ctctctgtag ctgggatcct ctctcctac tctcagatcg tctcctcctt aatgaggatg  
 481 tctccaccg agggcaagta caaagccttt tccacctgtg ggtctcacct ctgtgtggtc  
 40 541 tccttggtct atggaacagg acttggggtc tatctcagtt ctgctgtgac ccattcttcc  
 601 cagagcagct ccatggcctc agtgatgtac accatgttca ccccc (SEQ ID NO:88).

**OR61**

45 LOCUS AF127874 649 bp DNA PRI 28-FEB-2000  
 DEFINITION *Macaca sylvanus* olfactory receptor (MSY9) gene, partial cds.  
 ACCESSION AF127874  
 KEYWORDS .  
 SOURCE Barbary ape.  
 50 ORGANISM *Macaca sylvanus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

5 REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

10 FEATURES Location/Qualifiers

source 1..649

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>649

15 /gene="MSY9"

CDS <1..>649

/gene="MSY9"

/codon\_start=2

/product="olfactory receptor"

20 /translation="LADIGFTSTTVPKMLVNIQAQSNAISYAGCISQMYFFMVFGGID

TFLLTVMAYDRYVAICHPLYYPVIMNPRLCGLLVLSWFLSLSYSLIQSLLMLQLSFC

TSWVIQHFYCELAQALTLACSDTHINYILLYVVTGLLGFVPFSGILFSYTQIVSSILR

ISSTDGKHKAFSTCGSHLSVVFLFYGTGLGVYLLSSNASSSSWRGMVASVMYTVVTP" (SEQ ID

NO:89).

25 BASE COUNT 114 a 196 c 140 g 199 t

ORIGIN

1 ctggctgac atcggttca cctccaccac agtccccaag atgctggtga acatccaggc

61 gcagagcaat gccatcagct atgcaggctg catctcccag atgtattttt tcatggtttt

121 tggaggcata gacacatttc tctcaccgt gatggcctat gaccggtatg tgcccatctg

30 181 tcacccctg tactaccctg tcattatgaa cccccgcctc tgtggcctgc tggttctgt

241 gtcttggttc ctgagctgt cactaccct gatccagagt ctgttgatgc tgcagttgtc

301 cttttgcacc agttgggtca ttcagcatt ttactgcgag ctgtctcagg ccctcacgct

361 tgctgtctca gacacacaca tcaattacat cctgtcttac gtggcgaccg gccttctggg

421 tttgtgcc tctcaggaa tcttttctc ctacacccaa attgtctct ccactctgag

35 481 aatctcatcc acagatggga aacacaaagc cttttctacc tgcggatctc atctgtctgt

541 gggtttttt ttctatggga caggccttgg tgtgtatctt agttccaatg catcgtctc

601 ttcttgccgg ggcattgttg cctcgtcat gtacactgtg gtcaccccc (SEQ ID NO:90).

## OR62

40

LOCUS AF127875 649 bp DNA PRI 28-FEB-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA21) gene, partial cds.

ACCESSION AF127875

KEYWORDS

45 SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

50 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>649

/gene="CJA21"

CDS <1..>649

/gene="CJA21"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDICVTSTTLPKTLSNIQTHSKVITYAGCVTQLYFFVLFGLD

SLLPVTVMAYDRFVAICHPLHYTVIMNPQFCGLLVLSWIMSLHSLTESLMVYPLLFC

TDLKIPQFFCEIHQIIQFACSDTFLNNLVMYLSTVLLGGGPLAGILYSYSKIASSIRA

ISSAEGKYKAFSTCASHLSVVSIFYCTGLGVYLSSAATHSSLSSAAASVMYTVVTP" (SEQ ID

NO:91).

BASE COUNT 137 a 184 c 133 g 195 t

ORIGIN

1 cttgtggac atctgtgtta cctccaccac actccgaag acactgtcaa acatccagac

61 acacagcaaa gtcacacct atgcaggctg cgtcaccag ttgtactct ttgtactctt

121 cataggggtg gacagcttac tcccaccgt gatggcctat gaccggttg tggccatctg

181 tcaccacctg cactacacgg tcatcatgaa ccctcagttc tgggactgc tggttctggt

241 gtctctggatc atgagtgccc tgcattcttt gacagaaagc ttaatggtat acccaactgtc

301 cttttgtaca gacttgaaaa tccccagtt ttctgtgaa attcatcaga taattcaatt

361 tgctgttct gacacctttc ttaataacct ggtgatgtat ttgtcaactg tgctctggg

421 cgggtggtccc ctgtctggga tctgtactc ttactctaag atagcttct ctatactgac

481 aatctcatca gctgagggga agtacaaggc atttccacc tgtgcatctc acctctcagt

541 tgtctcctta tttattgta caggcctagg ggtgtacctg agttctgctg caaccacag

601 ctcactctca agcgcagcag cctcggtgat gtacacagtg gtcaccccc (SEQ ID NO:92).

## OR63

LOCUS AF127876 649 bp DNA PRI 28-FEB-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA22) gene, partial cds.

ACCESSION AF127876

KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

```

source      1..649
            /organism="Callithrix jacchus"
            /db_xref="taxon:9483"
5  gene      <1..>649
            /gene="CJA22"
CDS         <1..>649
            /gene="CJA22"
            /codon_start=2
            /product="olfactory receptor"
10          /translation="LVDICFTSTTVPKILVNIQEQSGTISYAGCIAQMYFFMVFGGMD
            TFLLTVMAYDRYVAICHPLSYPVIVNPRLCGLLVLSWFLSLSYSLLIQLSLLMLRLSFC
            TSWVIQHFYCELAQVLTACSDTHVNYILLYMVTGLLGCVPFSGILFSYIQIVSSILR
            IPSTDGKHKAFSTCGSHLSVVSFLFYGTGLGVYLSSNASSSSWWGMVASAMYTVVTP" (SEQ ID
NO:93).
15  BASE COUNT  112 a  193 c  140 g  204 t
    ORIGIN
        1  ctggttgac atctgttca cctccaccac agtccccaag attctggtga acatccagga
        61  gcagagtgg accatcagct atgcaggctg cattgccagc atgtatttt tcatggttt
        121  tggaggcatg gacacattc tctcactgt gatggcctat gaccggtatg tggctatctg
20  181  tcacccctg tctaccctg tcattgtaa ccccgccctc tgcggcctgt tggttctgt
        241  gtctctgttc ctacgttct cactaccct gatccagagt ctgtgatgc tgcggctatc
        301  cttctgcacc agttgggtca ttcagcactt ttactgtgag ctgtctcagg ttctcagct
        361  tgctgtctca gacacacatg tcaattacat cctgtcttac atggtgaccg gccttctggg
        421  ctgtgttccc ttctcaggga tccttttctc ctacatcaa attgtctcct ccctcctgag
25  481  aatcccatcc acagatggga aacataaagc ctttctacc tgtggatctc atctgtctgt
        541  gggttcttta ttctcaggga caggccttgg tgtctacctt agctccaatg cctcgtcctc
        601  ttctgtgtgg ggcattgtgg cctcagccat gtacacagtg gtcaccctc (SEQ ID NO:94).

OR64
30  LOCUS  AF127877  649 bp  DNA      PRI    28-FEB-2000
    DEFINITION  Callithrix jacchus olfactory receptor (CJA23) gene, partial cds.
    ACCESSION  AF127877
    KEYWORDS
35  SOURCE  Callithrix jacchus.
        ORGANISM  Callithrix jacchus
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
            Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.
    REFERENCE  1 (bases 1 to 649)
40  AUTHORS  Giorgi,D.G. and Rouquier,S.P.
        TITLE   The olfactory gene repertoire in primates and mouse: evidence for
            reduction of function in primates
        JOURNAL  Unpublished
    REFERENCE  2 (bases 1 to 649)
45  AUTHORS  Giorgi,D.G. and Rouquier,S.P.
        TITLE   Direct Submission
        JOURNAL  Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
            Montpellier Cedex 5 34396, France
    FEATURES             Location/Qualifiers
50  source      1..649
            /organism="Callithrix jacchus"
            /db_xref="taxon:9483"
        gene      <1..>649
            /gene="CJA23"

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CDS <1..>649  
 /gene="CJA23"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FTDICFTTVIVPRMLVNFLSGTKVIPYMGCLVQMYFFMAFGNTD  
 SYLLASMAIDRLVAICNPLHYDVAMNPRHCLLMLLGSCSISHLHSLFRVLLMSHLSFC  
 ASHVIKHFFCDTQPVLKLSGSDTSSSQMVVMTETLAVIVTPFLCIIFSYLRIITVLR  
 IPFAAGKWRAFSTCGSHLTVVALFYGSIYYVYFRPLSMYSVVKDRVATVMYTVVTP" (SEQ ID

NO:95).

BASE COUNT 126 a 192 c 139 g 192 t  
 ORIGIN

1 ttccaggat atctgctca caacagtcag agtgcccagg atgctgggga atttctatc  
 61 agggacaaag gttatccctt acatgggctg cctgggtcaa atgtacttct tcatggcctt  
 121 tgggaacact gacagctacc tgctggcctc tatggccatc gaccggctgg tggccatctg  
 181 caacccttta cactatgatg tggctatgaa cccccggcat tgcctactca tgctattggg  
 241 ttcttgagc atctccacc tacattccct gttccgggtg ctacttatgt ctcacctgtc  
 301 ttctgtgcc tccacgtca ttaagcactt ttctgtgac acccagcctg tgctaaagct  
 361 gtctgtctct gacagctcct ccagccagat ggtgggtcatg actgagactt tagctgtcat  
 421 tgtgacccc ttctgtgta tcatcttctc ctacctgca atcatcatca ctgtgctcag  
 481 aatccctttt gcagctggga agtggagggc cttctctacc tgggctccc acctactgt  
 541 agtagccctt ttctacggga gtatatatta tgtctatttt aggccctgt ccatgtactc  
 601 agtgggaag gaccgagtag ccacagttat gtacacagta gtgacaccc (SEQ ID NO:96).

## OR65

LOCUS AF127878 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA24) gene, partial cds.  
 ACCESSION AF127878  
 KEYWORDS

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>649

/gene="CJA24"

CDS <1..>649

/gene="CJA24"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAVLD

VFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
TDLEIPHFFCELNQVIHLACSDTFLNDVVMYLA AVLGGGPLAGILYSYSKIVSSIRA  
ISSAQGKYKAFSTCVSHLIVSLFYGTLLGVYLSAATGNSHSRAAASVMYTVVTP" (SEQ ID

NO:97).

5 BASE COUNT 136 a 177 c 134 g 202 t  
ORIGIN

1 cttttagac atctgttttg tgtctaccac tgtcccaaag atgctggtaa atatccagac  
61 acacagcaaa gtcacacac ttcagaggctg catcacccag ataggccatt gcctactctt  
10 121 tgcagtattg gacgtcttta tgctgactgt gatggcctat gaccgggatg tggccatctg  
181 tcacccactg cactacacag tcaccattaa ccccagactg tgtggactgc tggttctggc  
241 atcctggatc ctgagtggcc tgaattctc attacaacc ttaatagtgc tgcggctttc  
301 cttctgcaca gacttggaaa tccccactt ttctgcgaa cttaatcagg tcacccacct  
361 tgcctgttct gacacttttc ttaatgatgt ggtgatgtat ttggccgctg tgctgctggg  
421 ggggtggccc ctgcaggga ttctttactc ttactctaag atagtttctc ccatacgtgc  
15 481 aatctcatca gtcaggggga agtacaaggc attttccacc tgtgtatctc acatcttaat  
541 tgtctcctta tttatggta cactcctagg tgtgtacctt agttctgctg caactggcaa  
601 ctcacattca agagctgcag cctcgggtgat gtacactgtg gtacaccccc (SEQ ID NO:98).

## OR66

20 LOCUS AF127879 649 bp DNA PRI 28-FEB-2000  
DEFINITION Callithrix jacchus olfactory receptor (CJA25) gene, partial cds.  
ACCESSION AF127879  
KEYWORDS .  
25 SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
REFERENCE 1 (bases 1 to 649)  
30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
35 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
40 source 1..649  
/organism="Callithrix jacchus"  
/db\_xref="taxon:9483"  
gene <1..>649  
/gene="CJA25"  
45 CDS <1..>649  
/gene="CJA25"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FADICFTSTTVPKMLVDIQTQSKMITFAGCLTQIFFFVAFGCLD  
50 NLLLTVMAYDRFVAICHPLHYAVIMNPRLCRLVLGWCISVMVSLLETLTILRLSFC  
TNMEIPHFFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR  
VSPAQQQHKAFASTCGSHLSVVTLFYGTGLGVYLSLAATPSSRTSLMASVMYTMVTP" (SEQ ID

NO:99).

BASE COUNT 130 a 183 c 136 g 200 t



# ORIGIN

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1 cttgctgac atctgtttca catccacgac cgtcccaaag atgctgggtg atatccaaac
61 acaaagcaaa atgatacatt ttgcagggtg cctcaccag attttttt tegtgcatt
121 tggatgcctg gacaattgc tcttgaccgt gatggcctat gaccgggtcg tggccatctg
181 tcacccctg cactacgagg tcacatgaa ccccggtc tgtagactgc tagttctggg
241 gtcctgggtg atcagtgtca tggtttctc gctcgagacc ttgaccattt tgaggctgtc
301 cttctgcaca aacatggaaa tcccacactt ttttgtgat gttctgaag tcctgaagct
361 cgcctgttct gaaaccctcg tcaataaaat cgtgatgtat ttgtgacaa ttgcaatggg
421 tgttttctc ctctctggaa tcctatactc ttattctcag atttctcct ccatcctgag
481 agtatcacct gcccaaggcc agcacaagc ctttccacc tgtgggtctc acctctcagt
541 ggtcacctg ttctatggca cgggccttgg ggtatatctc agtcttcag ctacaccatc
601 ttctaggaca agtctgatgg cctcggtgat gtacaccatg gtcaccccc (SEQ ID NO:100).

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# OR67

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LOCUS AF127880 649 bp DNA PRI 28-FEB-2000
DEFINITION Callithrix jacchus olfactory receptor (CJA26) gene, partial cds.
ACCESSION AF127880
KEYWORDS
SOURCE Callithrix jacchus.
ORGANISM Callithrix jacchus
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.
REFERENCE 1 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE The olfactory gene repertoire in primates and mouse: evidence for
reduction of function in primates
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE Direct Submission
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
source 1..649
/organism="Callithrix jacchus"
/db_xref="taxon:9483"
gene <1..>649
/gene="CJA26"
CDS <1..>649
/gene="CJA26"
/codon_start=2
/product="olfactory receptor"
/translation="LADIGLTSTTVPRITVNIQTHSRVIA YASCLTQMSFSIFFVCME
DMLLAVMAYDRFVAICHPLHYPVIMSPRLCGFLVLVSAFLSLLISQVHNLIIVLQFSCF
KDIKISNFFCDPSQLLTLACSDTFVNNNIVMNFFAAVFGFLPISGIFLSYYKIVSSIL
RVPSSSGKYKAFSTCSSHLAVVCLFYGTVLGVYLGSSVSSPRKRVVTSVMYTVVTP" (SEQ ID
NO:101).
BASE COUNT 138 a 161 c 124 g 226 t
ORIGIN
1 cttgctgac attggttga cctccaccac cgtccccagg acaattgtga acattcaaac
61 tcacagcaga gtcacgcct atgcaagctg cctgacacag atgtctttt caatctttt
121 tgtgtgatg gaagacatgc tccttgctgt gatggcctat gaccggttg tggccatctg
181 tcacctctg cactatccag tcacatgag cccacgactc tgtggcttct tagtgttgt

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241 gtctgctttt cttagccttt taatatccca ggtgcacaat ttgattgtct tacaattttc  
 301 ttgcttcaaa gatataaaga ttcttaattt cttctgtgac ccttctcaac tcttcacact  
 361 tgcttgctcc gacacgtttg tcaataacaa catagtcattg aatttctttg ctgctgtatt  
 421 tggttttctt cccatctcag ggcatttttt gtcttactat aaaattgttt cctccattct  
 481 gagagtcca tcatacaagt ggaagtataa agccttctct acctgtagct ctcacctggc  
 541 agttgtttgc ttatttatg gaacagtcct tggagtgtac cttgggtcat cagtgtcatc  
 601 cccaggaag agagtgtgga cctcagtgat gtacacagt gtcactccc (SEQ ID NO:102).

## OR68

LOCUS AF127881 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA62) gene, partial cds.  
 ACCESSION AF127881  
 KEYWORDS .

SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"

gene <1..>649  
 /gene="CJA62"

CDS <1..>649  
 /gene="CJA62"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFVSTTVPKTLVNIQTHSKVITFAGCITQIGHCLLFAVLD  
 VFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
 TDLEIPHFVCVLNQNVIHLACSDTFLNDVVMYLA AVLLGGGPLAGILYSYSKIVSSIRA  
 ISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP" (SEQ ID

NO:103).

BASE COUNT 133 a 179 c 135 g 202 t

ORIGIN

1 cttttagac atctgtttt gtgtaccac tgtcccgaag acgctggtaa atatccagac  
 61 acacagcaaa gtcattcact ttgcaggctg catcacccag ataggccatt gcctcctctt  
 121 tgcagtattg gacgtcttta gtgtgactgt gatggcctat gaccggatg tggccatctg  
 181 tcaccactg cactacacag tcaccattaa cccagactg tgtggactgc tggttctggc  
 241 atcctggatc ctgagtccc tgaattctc attacaaacc ttaagtgc tgcggcttcc  
 301 cttctgcaca gacttggaaa tccccactt ttctgcgta cttaacagg tcattccact  
 361 tgctgttct gacactttc ttaatgatgt ggtgatgtat ttggccgctg tgcgtctggg  
 421 ggggtgtccc cttgcaggga ttcttactc ttacttaag atagtttct ccatacgtgc  
 481 aatctcatca gtcaggggga agtacaaggc atttccacc tgtgtatctc acatctaat

541 tgtctcctta tttatggta cactcctagg tgtgtacctt agttctgctg caactggcaa  
601 ctcacattca agagctgcag cctcggtgat gtacactgtg gtcaccccc (SEQ ID NO:104).

## OR69

LOCUS AF127882 649 bp DNA PRI 28-FEB-2000  
DEFINITION Callithrix jacchus olfactory receptor (CJA80) gene, partial cds.  
ACCESSION AF127882  
KEYWORDS .

SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649  
/organism="Callithrix jacchus"  
/db\_xref="taxon:9483"

gene <1..>649  
/gene="CJA80"

CDS <1..>649  
/gene="CJA80"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FTDICFTTVIVPRMLVNFLSETKVISYMGCLVPMYFFMAFANTD  
SYLLASMAIDRLVAICNPLHYDVAMNSRRCLLMLLGSCSISHLHSLFRVLLMSRLSFC  
ASHVIKHHFFCDTQPVLKLSGSDTSSSQMVVMTETLAVIVTPFLCIIFSYLRIITVLR  
IPSAAGKWRAFSTCGSHLTVVALFYGSIIVYFRPLSMYSVVKDRVATVMYTVVTP" (SEQ ID

NO:105).

BASE COUNT 123 a 194 c 139 g 193 t

ORIGIN

1 tttcacggat atctgctca caacagtcac agtgcccagg atgctggtga atttctatc  
61 agagacaaag gttatctct acatgggctg cctgggtccca atgtactct tcatggcctt  
121 tgcgaacact gacagctacc tgctggcctc tatggccatc gaccggctgg tggccatctg  
181 caacccctta cactatgatg tggctatgaa ctcccggcgt tgctactca tgctattggg  
241 ttctgcagc atctcccacc tacattccct gttccgggtg ctactatgt ctgcctgtc  
301 ttctgtgcc tcccagctca ttaagcactt ttctgtgac acccagcctg tgctaaagct  
361 gtctgctct gacacgtcct ccagccagat ggtggtcatg actgagacct tagctgttat  
421 tgtgaccccc ttctgtgta tcattcttc ctacctgga atcatcatca ctgtgctcag  
481 aatcccctct gcagccggga agtggagggc cttctctacc tgtggtccc acctcactgt  
541 agtagccctt ttctacggga gtattatta tgtctatctt aggcacctgt ccatgtactc  
601 agtgggtgaag gaccgagtag ccacagttat gtacacagta gtgacaccc (SEQ ID NO:106).

## OR70

LOCUS AF127883 649 bp DNA PRI 28-FEB-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA81) gene, partial cds.

ACCESSION AF127883

KEYWORDS

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>649

/gene="CJA81"

CDS <1..>649

/gene="CJA81"

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/product="olfactory receptor"

/translation="FADICFTSTTVPKMLVDIQTQSKMITFAGCLTQIFFFVAFGCLD

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TNMEIPHFFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR

VSPAQQQHKAFASTCGSHLSVVTLFYGTGLGVYLSSAATPSSRTSLMASVMYTMVTP" (SEQ ID

NO:107).

BASE COUNT 130 a 184 c 136 g 199 t

ORIGIN

1 ctttctgac atctgctca catccacgac cgtcccaaag atgctggtgg atatccaaac

61 acaaagcaaa atgatcactt ttgcagggtg cctcaccag attttttt tcgttgcat

121 tggatgcctg gacaattgc tctgaccgt gatggcctat gaccggttcg tggccatctg

181 tcacccctg cactacgagg tcacatgaa ccccggtc tgtagactgc tagtctggg

241 gtctggtgc atcagtgtca tggttctct gctcgagacc ttgaccattt tgaggctgc

301 cttctgcaca aacatggaaa tcccacactt ttttgtgat gttctcgaag tcctgaagct

361 cgcctgttct gaaaccctcg tcaataaat cgtgatgat ttttgacaa ttgcaatggg

421 tgttttctct ctctctggaa tcctatactc ttattctcag attttctct ccacctgag

481 agtatcact gcccaaggcc agcacaaagc cttttcacc tgtgggtctc acctctcagt

541 ggtcacctg ttctatggca cgggccttgg ggtatatctc agttctgcag ctacaccatc

601 ttctaggaca agtctgatgg cctcggtgat gtacaccatg gtcacccc (SEQ ID NO:108).

## OR71

LOCUS AF127884 649 bp DNA PRI 28-FEB-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA82) gene, partial cds.

ACCESSION AF127884

## KEYWORDS

SOURCE *Callithrix jacchus*.ORGANISM *Callithrix jacchus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; *Callithrix*.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene &lt;1..&gt;649

/gene="CJA82"

CDS &lt;1..&gt;649

/gene="CJA82"

/codon\_start=2

/product="olfactory receptor"

/translation="FADICFTSTTVPKMLVGIQTQSKMITFAGCLTQIFFFVAFGCLD

NLLLTVMAYDRFVAICHPLHYAVIMNPRLCRLVLGSWCISVMVSLLETILTILRLSFC

TNMEIPHFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR

VSPAQQQHKAFASTCGSHLSVVTFLFYGTGLGVYLSSAATPSSRTSLMASVMYTMVTP" (SEQ ID

NO:109).

BASE COUNT 129 a 183 c 137 g 200 t

## ORIGIN

1 ctttctgac atctgtttca catccacgac cgtcccaaag atgctggtgg gtatccaac

61 acaaagcaaa atgatacatt ttgcagggtg cctcaccag atttttttt tcgttcatt

121 tggatgcctg gacaatttc tctgaccgt gatgcctat gaccggttcg tggccatctg

181 tcacccctg cactacgagg tcatacgaa ccccggtc ttagactgc tagttctggg

241 gtctgtgtc atcagtgtca tggtttct gctcgagacc ttgaccatt ttaggctgtc

301 cttctgcaca aacatggaaa tcccacatt ttttgtgat gtctcgaag tcctgaagct

361 cgctgttct gaaaccctg tcaataaaat cgtgatgtat ttgtgacaa ttgcaatggg

421 tgttttct ctctctgaa tcctatactc ttattctcag atttctct ccatactgag

481 agtatcact gccaagggc agcacaagc ctttccacc tgtgggtctc acctctcagt

541 ggtcaccctg ttctatggca cgggccttg ggtatatctc agttctgcag ctacaccatc

601 ttctaggaca agtctgatgg cctcggtgat gtacaccatg gtcaccccc (SEQ ID NO:110).

## OR72

LOCUS AF127885 658 bp DNA PRI 28-FEB-2000

DEFINITION *Pongo pygmaeus* PPY10 pseudogene, partial sequence.

ACCESSION AF127885

## KEYWORDS

SOURCE *orangutan*.ORGANISM *Pongo pygmaeus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; *Pongo*.

REFERENCE 1 (bases 1 to 658)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
5 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 658)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
10 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue de la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..658  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
15 gene <1..>658  
/gene="PPY10"  
/pseudo  
BASE COUNT 131 a 176 c 135 g 216 t  
ORIGIN  
20 1 ctgcctgac atcggtttca cctcccgc atgtcccaag atgattgtgg acatccaatc  
61 tcacagcaga gtcatttct aggcaggcta cctgactcag atgtctctct ttgccatttt  
121 tggaggcgtg gaagagagac atgtcctga gtgtgaaggc ctatgaccgg ttgtagcca  
181 cctgtcacc tctgtatcat tcagccatca tgaagtcag ttctgtggc ttctagttt  
241 tgtgtcttt ttttttctc tcagtcttt agacgcccaa ctgcacaact tgattgcctt  
25 301 gcaaatggcc tgcttgagg atgtggaat ttctaattc ttctgtgacc cttctcaact  
361 ccccatctg catgttgta cagcttcacc gataacatca tcacgtatct cctgacgcc  
421 atatccccct ttattcccat ctgggggacc cttttctta taatatcaaa ttgttcctc  
481 cattctgagg gcttcatcat cagggtggag gtataaagcc ttctccatct gtgggtctca  
541 cctgtcagtt gttgtctat ttatggaac aggcataatgg gggtacctca gttcagatgt  
30 601 gtcatcttc ctgagaaagg ctgcagtac ctacgtgatg tacaccgtgg tcaccccc (SEQ ID NO:111).

## OR73

LOCUS AF127886 649 bp DNA PRI 28-FEB-2000  
35 DEFINITION Pongo pygmaeus olfactory receptor (PPY11) gene, partial cds.  
ACCESSION AF127886  
KEYWORDS .  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
45 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
50 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue de la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"  
 gene <1..>649  
 /gene="PPY11"  
 CDS <1..>649  
 /gene="PPY11"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LADIGFTSTTVPKMIVDMQTHSRVISYAGCLTQMSFFVLFACMD  
 DMLLSVMAYDRFVAICHPPDYPVTMNPFCGFLVLLSFFLSLLDSQLHNWIALQITCF  
 KDVEIPNFFCDPSQLPHLACCDTFTNDIVMYFLAAIFGFLPILGILFSYYKIVSSILR  
 VSSSGGRYKAFATCGSHLSVCLFYGTALGGYLSSDMSSYPRKGAVASVMYTVVTP" (SEQ

ID NO:112).

BASE COUNT 125 a 174 c 130 g 220 t

ORIGIN

1 ctggctgac atcggttca cctccaccac ggtcccaag atgattgtgg acatgcaaac  
 61 tcacagcaga gtcactcct atgcaggctg cctgactcag atgtctttt ttgtccttt  
 121 tgcattgatg gatgacatgc ttctgagtgt gatggcctat gaccggttg tggccatctg  
 181 tcacctccg gattaccag ttaccatgaa cccatgttc tgggcttcc tagttttgt  
 241 gtctttttt ctcagtctt tagactccca gctgcacaat tggattgcct tacaaattac  
 301 ctgctcaag gatgtggaaa ttccaattt cttctgtgac cttcccaac tccccacct  
 361 tgcctgtgt gacacctca ccaatgacat agtcattgat ttcttctg ccatatttg  
 421 tttcttccc atcttggga tccttttct ttactataaa attgttct ccatctgag  
 481 gggttcac tcaggtggga ggtataaag ctcgccacc tgggctctc acctgtcagt  
 541 tgttgctta tttatggaa cagcccttg aggtacctc agttcagaca tgcctctta  
 601 tccagaaag ggtgcagtgg cttcagtgat gtacacagt gtcacccc (SEQ ID NO:113).

## OR74

LOCUS AF127887 654 bp DNA PRI 28-FEB-2000

DEFINITION Pongo pygmaeus PPY12 pseudogene, partial sequence.

ACCESSION AF127887

KEYWORDS .

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 654)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 654)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..654

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>654

/gene="PPY12"

/pseudo

BASE COUNT 124 a 178 c 135 g 217 t

ORIGIN

1 cttgcctgaa atcggtttca cctccaccac gatccccaag attgtggaca tccaatctca  
61 cagcagagtc atctcctctg caggcttgcc tgactcagat gtctctttgc catitttgga  
121 ggacaggaag agagacatgc tctgagtgat gatggcctat gaccggttg tagccatctg  
181 tcacctctca tatcattcag tcatcatgag cccgtgttc tgggcttc tagtttgg  
241 gtctttttt ttctctcag tcttttagac tccagctgc accactgat tgccttgcta  
301 atgacctact tcaaggatgt ggaaattccg aatttctct gtgatcctc tcaactcccc  
361 catattgcat gttgtgatgc cttaccaat aacatcatca tgtattccc tgtcaacatg  
421 ttgcttttc ttccatctc ggggactctt ttctcttact ctaatatgt ctctccatt  
481 ctgaggggtt cgtcatcagg tgggaaatat aaagccctct ccacctgtgg gtctcactgg  
541 tcagttgtt gctgagcttc tggacagggc gttggagggt acctcagttc agatgtgtca  
601 tctcccccga gaaaggtgc agtggcctca gtgatgtgca cctgggtcac cgcc (SEQ ID NO:114).

OR75

LOCUS AF127888 649 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY49) gene, partial cds.  
ACCESSION AF127888

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>649

/gene="PPY49"

CDS <1..>649

/gene="PPY49"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDTCFISTTVPKMLVNIQARSKEISYMGCLTQVYFLMMFAGMD

TFLAVMAYDRFVAICHPLQYAVIMNPHLCGLLVLASWFIIFWVSLVHILLMKRLTFS

TGTEIPHFFCELAQVLKVARSDTLNINVLVYVATALLGVFPVAGILFSYSQIVSSLMR

MSSTEGKYKAFSTCGSHLCVVSFLNGTGLGVYLSSAVTHSSQSSSMASVMYAMVTP" (SEQ

ID NO:115).

BASE COUNT 119 a 187 c 146 g 197 t

ORIGIN

1 cttgtggac acctgtttca tctccaccac agtccccaag atgctagtga acatccaggc  
61 acggagcaaa gaaatctct acatggggtg cctcactcag gtgtatttt taatgatgt  
121 tgctggaatg gatactttc tactggctgt gatggcttat gaccggttg tggccatctg  
181 ccacccctt cagtacgcgg tcatcatgaa ccccatctc tgtggcctgc tggttctggc



241 atcttggttc atcattttct gggctccct ggttcataat ctactgatga agaggctgac  
 301 ctctccaca ggcactgaga ttccgcattt ctctgtgaa ctggctcagg tctcaaggt  
 361 ggccccgtct gataccctcc tcaataacat tgtcttgat gtggccacgg cactgctggg  
 421 tgtgttctct gtagctggga tctcttctc ctactctcag atcgtctcct ccttaatgag  
 5 481 aatgctctcc accgagggca agtacaagc ctttccacc tgtggatctc acctctgtgt  
 541 ggtctccttg ttcaatggaa caggacttgg ggtctatctc agttctgctg tgaccattc  
 601 ttccagagc agctccatgg cctcagtgat gtatgcatg gtcaccccc (SEQ ID NO:116).

## OR76

10 LOCUS AF127889 660 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY50 pseudogene, partial sequence.  
 ACCESSION AF127889  
 KEYWORDS .  
 15 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 660)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 660)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..660  
 /organism="Pongo pygmaeus"  
 /db\_xref="taxon:9600"  
 gene <1..>660  
 /gene="PPY50"  
 35 /pseudo  
 BASE COUNT 122 a 181 c 146 g 211 t  
 ORIGIN

1 cttgcctgac atcagtttca cctccaccac ggtccccaag atgattgtgg acatccaatc  
 61 tcacagcaga gtcattctct atgcaggctg cctgactcag atgtgtctcc tggccatttt  
 40 121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgagcgg ttgtagccc  
 181 tctgtcaccc tctatctgt tcagccatct tgaacccgtg ttctgtggc ttctagatt  
 241 tgtggctttt gttttcttt tctcagttct tttagactcc cagtgcgca acttgattgc  
 301 ctacgcctg acctgcttca aggatgtgga aattcctaatt ttcttctggg aaccttctca  
 361 actcccccat ctacatttt gtgacacct caccagtaac atccacatgt atttcctgc  
 45 421 tgccgtattt ggttttcttc ccatctcggg ggcccttttc tcttacggta aaattgtttc  
 481 ctccattctg aggggttcat catcagggtg gaagtatcaa ctttctccac ctgtgggtct  
 541 cacctgtcag ttgtttgctg attttacgga acaggcgtg gagggtagct gggttcagat  
 601 gtgtcatccc ccccgagaaa ggggtgcagtg gcctcagtga tgtacacggt ggtcaccccc (SEQ ID NO:117).

## OR77

LOCUS AF127890 648 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY51 pseudogene, partial sequence.  
 ACCESSION AF127890

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..648

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>648

/gene="PPY51"

/pseudo

BASE COUNT 128 a 183 c 134 g 203 t

ORIGIN

1 ctttctgac atctgttttg tgtctagcac tctaccaaag atgctggtga atatccagac  
61 acacagcaaa gtcacacacat atgcaggctg catcacccag gtgtgctttt tcgtattctt  
121 tgcaggattg gacatctttc tctgactgt gatggcctat gacggtttgt gggcatctgt  
181 caccctctgc actacacggt catcatgagc cccaggctct gtggactgct ggttctggca  
241 tcttgatca tgagtgcctt gaattccttg ctacaaagct taatagtact gcggctttcc  
301 ttctgcacag atttggaat cccccacttt ttctgtgaac ttaacaggt caccacact  
361 gcctgttctg acacctttct taacgacatg gtgatgtatt tgcacatgc gttgtggggc  
421 ggtgtcccc tcactgggat ctttactct tactctaaga ttgttctc catactgca  
481 atctcatcag ctacggggaa gtacaaggca tttccacct atgcgtctca cctctcagtt  
541 gtctcttat ttatgggtac actcctaggg gtgtacctta gttctgctgc aaccacaac  
601 tcatactcaa gtgctgcagc ctggtgatg tacactgtgg tcaccccc (SEQ ID NO:118).

OR78

LOCUS AF127891 660 bp DNA PRI 28-FEB-2000

DEFINITION Pongo pygmaeus PPY52 pseudogene, partial sequence.

ACCESSION AF127891

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 660)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 660)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..660  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>660  
/gene="PPY52"  
/pseudo

BASE COUNT 122 a 181 c 146 g 211 t  
ORIGIN

1 cttgcctgac atcagtttca cctccaccac ggtccccaag atgattgtgg acatccaatc  
61 tcacagcaga gtcattcct atgcaggctg cctgactcag atgtgtctcc tggccatttt  
121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgagcgg ttgtagccc  
181 tctgtcacc tctatatcgt tcagccatct tgaacccgtg ttctgtggc ttctagatt  
241 tgtggtcttt gttttcttt tctcagctct tttagactcc cagctgcgca acttgattgc  
301 ctacgcctg acctgcttca aggatgtgga aattcctaatt tcttctggg aaccttctca  
361 actcccccattacatttt gtgacacctt caccagtaac atccacatgt atttccctgc  
421 tgccgtattt gggtttcttc ccatctcggg ggcccttttc tcttacggta aaattgtttc  
481 ctccattctg aggggttcat catcagggtg gaagtatcaa ccttctccac ctgtgggtct  
541 cactgtcag ttgttctgct attttacgga acaggcgttg gagggtagct gggttcagat  
601 gtgtcatccc ccccgagaaa ggtgtcagtg gcctcagtga tgtacacggt ggtcaccccc (SEQ ID NO:119).

OR79

LOCUS AF127892 633 bp DNA PRI 28-FEB-2000

DEFINITION Pongo pygmaeus PPY76 pseudogene, partial sequence.

ACCESSION AF127892

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 633)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 633)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..633  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>633  
/gene="PPY76"  
/pseudo

BASE COUNT 134 a 155 c 124 g 220 t

ORIGIN

1 cttgcctgac attggtttca ccttggccac ggtccccaag atgattgtag acatgcaatc  
61 acatagcaaa gtcattcccc atgcgggctg tctgacacag atatctttct ttgtcctttt

121 tgcattgata gatgacatgc tctgactgt gatggcctat gactgattcg tggccatctg  
 181 tcacccctg aactaccag tcatcatgaa tctcacctc tgtgtcttct tagtgttggt  
 241 gtcttttcc ttgacctgt ggattcccag ctgcacaatt ggattgttac aattcacctg  
 301 cttcaagaat gtggaaatct ttaattttgt ctgtgactga tctcaacctt gcctgttctg  
 361 actgtgtcat cagtaacata ttcatacatt tagatagtac aatacttggt ttcttccca  
 421 ttcagggat cctttgtct tactataaaa ttgtgccctc cattctaaga attccattgt  
 481 cagatgggaa gtataaagcc ttctccacct gtggctctca cctggcaatt gttgcttat  
 541 ttatgggaac aggcattggt gtgtacctga cttcagctgt gtcactatcc cccaggaatg  
 601 gtgtgtcag tgtgtatgt tgtggccacc ccc (SEQ ID NO:120).

## OR80

LOCUS AF127893 648 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY77 pseudogene, partial sequence.

ACCESSION AF127893

KEYWORDS .

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..648

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>648

/gene="PPY77"

/pseudo

BASE COUNT 140 a 172 c 129 g 207 t

ORIGIN

1 ctttctgac ctctgttta cctccacaac cgtcccaaag atgctactga atatactgac  
 61 acagaacaaa ttcataacat atgcaggctg tctcggtcag attttcttt tcacttcatt  
 121 tggatgcctg gacaatttac tctgaccgt gatggcctat gaccgcttca tggccatctg  
 181 tcacccctg cactacacac ggtcatcatg aaccaccagc tctgtggact gctggttcta  
 241 gggtcctagt gcatcagtgt catgggtccc tgctcaagac cttgactgtt ttgaggctgt  
 301 cctctgcaca aaatggaaat tccacacttt tttgtgac ttctgaagt cctgaagctc  
 361 gcctgttctg acaccttcac caataacgta gtgatatact ttgcaactgg catcctgggt  
 421 gtgattccct tcaactggaat acttttctc tactataaaa ttgtttctc tatactgagg  
 481 atttcctcag ctgggagaaa gtgcaaagcg tttccacct gtggttccca cctctcagtg  
 541 gtcagcttgt tctatggcac aggttttggg gtctatctca gttctgcagc tacaccatct  
 601 tctaggacaa gtctggtggc ctcaagtatg tacaccatgg ttaccccc (SEQ ID NO:121).

**OR81**

LOCUS AF127894 660 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY78 pseudogene, partial sequence.  
 5 ACCESSION AF127894  
 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 10 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 15 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 20 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..660  
 /organism="Pongo pygmaeus"  
 /db\_xref="taxon:9600"  
 25 gene <1..>660  
 /gene="PPY78"  
 /pseudo  
 BASE COUNT 118 a 185 c 140 g 217 t  
 ORIGIN  
 30 1 ctgacctgac atcggtttca cctccaccac ggtccccaag atgattgtgg acatccaatc  
 61 tcacagcaga gtcattcct atgcaggctg cctgactcag atgtgtctcc tggccatttt  
 121 tggaggcatg gaagagagac atgctcctga gtgtgatggc ctatgagcgg ttgtagccc  
 181 tctgtacccc tctatatcgt tcagccatct tgaacccgtg tttctgtggc ttcttagatt  
 241 tgtggtcttt gttttcttt tctcagttct ttagactcc cagctgcaca acctgattgc  
 35 301 ctacgcattg acctgcttca aggatgtgga aattcctaatt tcttctggg aaccttctca  
 361 actccccatt ctacatttt gtgacacctt caccagtaac atccacatgt atttcctgc  
 421 tgcctgattt ggttttcttc ccatctcggg ggcccttttc tcttactgta aaactgtttc  
 481 ctccattctg aggggttcat catcagggtg ggagtatcaa ccttctccac ctgtgggtct  
 541 cacctgtcag ttgtttgctt attttatgga acagcccttg gaggtacct cagttcagct  
 40 601 gtgtcccttt cctccaggaa ggggtgcagt gcctcagtga tgtacctggt ggtcaccccc (SEQ ID NO:122).

**OR82**

LOCUS AF127895 649 bp DNA PRI 28-FEB-2000  
 45 DEFINITION Pongo pygmaeus PPY85 pseudogene, partial sequence.  
 ACCESSION AF127895  
 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 50 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for

reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..649  
10 /organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>649  
/gene="PPY85"  
/pseudo  
15 BASE COUNT 118 a 174 c 131 g 226 t  
ORIGIN  
1 cttggctgac atcagttttg cctctaccac ggtccccaag atgattgtgg acatccaggc  
61 tcacacgaga ctcattcttt atgtgggctg cctgactcag atgtctttt tgatccttt  
121 cgcattgtat gaaagtctgc tctgactgt gatggcctat gaccggttg aggccatctg  
20 181 tcacccctg cactcccaag tcacacgag cccacgactc tgtggcctct tagttttggt  
241 gtctttttt cttagccttt tggacttca gctgcacaat ttgattgtgt tacaacttac  
301 ctgcttcaat gatgtggaaa tctctaattt ttctctgtga cccttctcaa ctctcagcc  
361 tggcctgttc tgacacctcc attataaca tggctgtata tttattggt gccatatttg  
421 gttttctccc tctctagggt atccttttct ctactataa aattatttct tccattctgc  
25 481 gagttcgctc ttacgggtggg aagtataaag ccttctccac ctgcagctct cacctgtcag  
541 ttgtttgctt attttatgga acagcccttg gagggtagct cagttcagct gtgtcccttt  
601 cctccaggaa ggggtcagtg gcctcagtga tgtacctggt ggtcacccc (SEQ ID NO:123).

## OR83

30 LOCUS AF127896 649 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY9) gene, partial cds.  
ACCESSION AF127896  
KEYWORDS .  
35 SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 649)  
40 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
50 source 1..649  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>649  
/gene="PPY9"

CDS <1..>649  
 /gene="PPY9"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFASTTVPKMLVNIQAQSKVITYAGCITQMYFFTHFVGLD  
 SFLTVMAYDRFVAICHPLHYTVIMNPQLCGLLVLASWIMSVLHSLQSLMVLRLSLC  
 RELEIPHFFCELNQVIHLACSDTFLDDMVMYLA AVLGGGCLAGILYSYKIVSSICA  
 ISSAQGKYKAFSTCASHLSVVSIFYCTSLGVYLSSAAIHNSHSSAIASVMYTVVTP" (SEQ ID

NO:124).

BASE COUNT 136 a 173 c 140 g 200 t  
 ORIGIN

1 cttttagac atctgtttg cctctaccac ggtcccaaag atgctggtga atatccaggc  
 61 acagagcaaa gttatcacct atgcaggctg catcacccag atgtactttt tcacacattt  
 121 ttaggattg gacagctcc tcctaactgt gatggcctat gaccggttg tggccatctg  
 181 tcacccctg cactacacgg tcatcatgaa cctcaactc tgggattgc tggttctggc  
 241 gtctggatc atgagtgtct tgcattcctt attacaagc ttaatgggc tgcggtgtc  
 301 ctatgcaga gagttggaaa tccccactt ttctgcgaa cttaatcagg tcatccacct  
 361 tgctgttct gacaccttc ttgatgacat ggtgatgtat ttggcagctg tgctgtctggg  
 421 tgggggatgt ctgctggga tctttactc ctactctaag atagtttct ccatatgtc  
 481 aatctcatca gctcaaggga agtataaggc attttccacc tgtcatctc acctctcagt  
 541 tgtctcctg tttattgta cgagcctagg agtgtacct agctcgctg caatccaca  
 601 ctcacactca agtgcaatag cctcagtgat gtacaccgtg gtcaccccc (SEQ ID NO:125).

## OR84

LOCUS AF127897 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO27) gene, partial cds.  
 ACCESSION AF127897  
 KEYWORDS

SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"

gene <1..>649  
 /gene="SBO27"

CDS <1..>649  
 /gene="SBO27"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LVDFCLATDTIPKMLVSLQTRSKAISYPCCLTQMYFFHFFGIVD

SVLIAVMAYDRFVAICHPLHYATIMSPRLCGLLVGAPWVFSCFISLTHILLMARLVFC  
 GSLKVPHYLCDLTPILRLSCTDTSVNRIFILTVAGMVIATPFICILASYACILVAIMK  
 IPSAGGRKKAFASTCSSHLSVVALFYGTTIGVYLCPSVHTAVKEKASAVMYTVVTP" (SEQ ID

NO:126).

5 BASE COUNT 112 a 218 c 145 g 174 t

ORIGIN

1 cctggtgat ttctgtctgg ccaccgacac catccccaag atgctggtga gccttcaaac  
 61 caggagcaag gccatctctt atccctgctg cctgaccag atgtacttct tccatttctt  
 121 tggcatcgtg gacagcgtct taattgctgt aatggcgtat gaccgcttg tggccatctg  
 10 181 ccacccttg cactacgcca cgatcatgag cccacgcctc tgtggcctgc tggcggggc  
 241 ccctgggtg tttcatgct tcactcact caccacatc ctctgatgg ccgcctcgt  
 301 tttctgggc agcctcaagg tgcctcatta ctgtgcgac ctactccca tctccgact  
 361 ttcgtgcaca gacacgtctg tgaacaggat tttcatcctc actgtggcag ggatggtgat  
 421 agccacgccc tcatctgca tctggcctc ctatgctgc atcctgtag ccatcatgaa  
 15 481 gatccctct gcaggtggca ggaagaaagc cttctccacc tgcagctccc acctgtcct  
 541 gggtgctct tctatggga ccaccattgg ggtctacgtg tgcctcct cggtccacac  
 601 cgctgtaaag gagaaagct ctgctgtgat gtacacagta gtcacccc (SEQ ID NO:127).

## OR85

20 LOCUS AF127898 646 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO28) gene, partial cds.  
 ACCESSION AF127898

KEYWORDS

25 SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 646)

30 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 646)

35 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

40 source 1..646  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 gene <1..>646  
 /gene="SBO28"

45 CDS <1..>646  
 /gene="SBO28"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LADIGFTSTTVPRITVNIQTHSRVIAAYASCLTQMSFSIFFACME  
 50 DTLLAVMAYDRFVAICHPLHYVIMNPRLCGFLVLVSFLLISQVHNLIVLQFSCF  
 KEIKISNFFCDPSQLLTLCSDTFVNNIVTNFFAAVFGFLPISGIFFSYKYIAPSILR  
 VPLSSGKYKAFSTCSSHLAVVCLFYGTIVIGVYLGSSMASPRKSVVASVMYTVVTP" (SEQ ID

NO:128).

BASE COUNT 137 a 167 c 122 g 220 t



# ORIGIN

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1 cttggtgac attggttca cctccaccac agtccccagg acaattgtga acattcaaac
61 tcacagcaga gtcacgcct atgcgagctg cctgacacag atgtctttt caatatttt
121 tgcgtgatg gaagacacgc tcctggctgt gatggcctat gaccggtttg ttgccatctg
181 tcacccctg cactaccag tcacatgaa cccacgactc tgggcttct tagtgttgt
241 gtctgtttt ctagccttt taatatcca ggtgcacaat ttgattgct tacaatttc
301 ttgctcaaa gagataaaga ttctaattt cttctgtgac cttctcaac tcctcacct
361 ttctgttct gacaccttg tcaataacat agtcacgaat ttcttgctg ctgtatttg
421 tttctccc atctcaggga tcttttctc ttactataaa attgccccct ccattctgag
481 agttcatta tcaagtgga agtataaagc cttctcacc ttagctctc acctggcagt
541 tgttgctta tttatggaa cagtcattg agtgacctt gggcatcaa tggcatcccc
601 caggaagagt gtgtggcct cagtgtgta cacagtggc actccc (SEQ ID NO:129).

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# OR86

LOCUS AF127899 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO29) gene, partial cds.  
 ACCESSION AF127899  
 KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>649

/gene="SBO29"

CDS <1..>649

/gene="SBO29"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAALD

IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC

TDLEIPRFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA

ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSHSGAAALVMYTVVTP" (SEQ ID

NO:130).

BASE COUNT 138 a 177 c 133 g 201 t

# ORIGIN

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1 cttgtagac atctgtttg tgtctaccac tgtccgaag atgctggtaa atatccagac
61 acacagcaaa gtcacacct ttgcaggctg catcaccag ataggccatt gcctactctt
121 tcagcattg gacatctta tgcgtactgt gatggcctat gaccggatg ttgccatctg
181 tcacccctg cactacacag tcaccattaa cccagactg tgggactgc tgggtctggc

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09747155.122100

241 atcctggatc ctgagtgtccc tgaattcttc attacaaacc ttaatagtgc tgcggctttc  
301 cttctgcaca gacttggaaa tcccccgctt ttctgcgaa cttaatcagg tcatacatct  
361 tgcctgttat gacactttcc ttaatgatgt ggtgatgtat ttggcagcta tgctgctggg  
421 cgggtgtccc ctcacaggaa ttatttactc ttactctaag atagtttctt ccatacgtgc  
5 481 aatctcatca gctcagggga agtacaaggc gtttccacc tgtgcatctc acatcttaat  
541 tgctcctta tttatggta cactcctagg tgtgtacctt agttctgctg caactggcaa  
601 ctcacattca ggtgctgcag ccttggtgat gtacactgtg gtcaccccc (SEQ ID NO:131).

## OR87

10 LOCUS AF127900 649 bp DNA PRI 28-FEB-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO30) gene, partial cds.  
ACCESSION AF127900  
KEYWORDS .

15 SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 649)

20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

30 source 1..649  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"

gene <1..>649  
/gene="SBO30"

35 CDS <1..>649  
/gene="SBO30"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDICFVSTTVPKMLVNIQTHSKVITFADCITQIGHCLLFAALD  
40 IFMLTVMAYDRYVATCHPLHYTVTINPRLCGLLVLASWILSALNSSLQPLIVLRLSFC  
TDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA  
ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSSHSSAAALVMYTVVTP" (SEQ ID

NO:132).

BASE COUNT 141 a 179 c 130 g 199 t

ORIGIN

45 1 cttttagac atctgttttg tgtctaccac tgtcccgaag atgctggtaa atatccagac  
61 acacagcaaa gtcacacact ttgcagactg catcacccag ataggccatt gcctactctt  
121 tgcagcattg gacatcttta tgctgactgt gatggcctat gaccggatg tggccacctg  
181 tcacccccctg cactacacag tcaccattaa ccccagactg tgtggactgc tggttctggc  
50 241 atcctggatc ctgagtgtccc tgaattcttc attacaacce ttaatagtgc tgcggctttc  
301 cttctgcaca gacttggaaa tccccactt ttctgcgaa cttaatcagg tcatacatct  
361 tgcctgttat gacactttcc ttaatgatgt ggtgatgtat ttggcagcta tgctgctggg  
421 cgggtgtccc ctcacaggaa ttatttactc ttactctaag atagtttctt ccatacgtgc  
481 aatctcatca gctcagggga agtacaaggc gtttccacc tgtgcatctc acatcttaat

541 tgtctcctta ttttatggta cactcctagg tgtgtacctt agttctgctg caactggcaa  
601 ctcacattca agtgcctgcag ccttggtgat gtacacagtg gtcaccccc (SEQ ID NO:133).

## OR88

LOCUS AF127901 649 bp DNA PRI 28-FEB-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC31) gene, partial cds.  
ACCESSION AF127901  
KEYWORDS .

SOURCE common squirrel monkey.  
ORGANISM Saimiri sciureus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649  
/organism="Saimiri sciureus"  
/db\_xref="taxon:9521"  
gene <1..>649  
/gene="SSC31"

CDS <1..>649  
/gene="SSC31"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAALD  
IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
TDLEIPHFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA  
ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSHSSAAALVMHTVVTP" (SEQ ID

NO:134).

BASE COUNT 141 a 178 c 131 g 199 t

ORIGIN

1 cttttagac atctgttttg tgtctaccac tgtccgaag atgctggtaa atatccagac  
61 acacagcaaa gtcacacct ttgcaggctg catcacccag ataggccatt gcctactctt  
121 tgcagcattg gacatcttta tgcctgactgt gatggcctat gaccggtatg tggccatctg  
181 tcacccctg cactacacag tcaccattaa cccagactg tgtggactgc tggctctggc  
241 atcctggatc ctgagtgtccc tgaattcctc attacaaacc ttaatagtgc tgcggctttc  
301 cttctgcaca gacttggaaa tccccactt tttctgcgaa cttaatcagg tcatacatct  
361 tgcctgttat gacactttcc ttaatgatgt ggtgatgtat ttggcagcta tgcctgctggg  
421 cgggtgtccc ctcacaggaa ttatttactc ttactctaag atagtttctt ccatacgtgc  
481 aatctcatca gctcagggga agtacaaggc gttttccacc tgtgcatctc acatcttaat  
541 tgtctcctta ttttatggta cactcctagg tgtgtacctt agttctgctg caactggcaa  
601 ctcacattca agtgcctgcag ccttggtgat gcacacagtg gtcaccccc (SEQ ID NO:135).

## OR89

LOCUS AF127902 646 bp DNA PRI 28-FEB-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC32) gene, partial cds.

ACCESSION AF127902

KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..646

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>646

/gene="SSC32"

CDS <1..>646

/gene="SSC32"

/codon\_start=2

/product="olfactory receptor"

/translation="LADIGFTSTTVPRITVNIQTHSRVIA YASCLTQVSFSIFFACME

DTLLAVMAYDRFVAICHPLHPVIMNPRLCGFLVLVSVFLSLLISQVHNLIVLQFSCF

KEIKISNFFCDPSQLLTLSCSDTFVNNIVTNFFAAVFGFLPISGIFFSYYKIASILR

VPLSSGKYKAFSTCSSHLAVVCLFYGTIVIGVYLGSSMASPRKSVVASVMYTVVTP" (SEQ ID

NO:136).

BASE COUNT 135 a 166 c 123 g 222 t

ORIGIN

1 cttggctgac attggttca cctccaccac agtccccagg acaattgtga acattcaaac

61 tcacagcaga gtcacgcct atgcgagctg cctgacacag gtgtctttt caatctttt

121 tgcgtgtatg gaagacacgc tcctggctgt gatggcctat gaccggttg ttgccatctg

181 tcacccctg cactaccag tcacatgaa cccagactc tgggcttct tagtgttggt

241 gtctgtttt cttagcctt taatatcca ggtgcacaat ttgattgtc tacaatttc

301 ttgctcaaa gagataaaga ttctaattt ctctgtgac cttctcaac tcctaccct

361 ttctgttct gacaccttg tcaataacat agtcacgaat ttcttgctg ctgtatttg

421 tttctccc atctcaggga tcttttctc ttactataaa atgcctctc caattctgag

481 agttccatta tcaagtggga agtataaagc ctctccacc ttagctctc acctggcagt

541 tgtttgctta tttatggaa cagttattgg agtgtacctt gggtcatcaa tggcatcccc

601 caggaagagt gtggtggcct cagtgtatga cacagtggc actccc (SEQ ID NO:137).

## OR90

LOCUS AF127903 649 bp DNA PRI 28-FEB-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC33) gene, partial cds.

ACCESSION AF127903

## KEYWORDS

SOURCE common squirrel monkey.

ORGANISM *Saimiri sciureus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene &lt;1..&gt;649

/gene="SSC33"

CDS &lt;1..&gt;649

/gene="SSC33"

/codon\_start=2

/product="olfactory receptor"

/translation="FSDLCFSSVTIPKLLQNMQSQDPSIPYAGCLTQMYFFLYFSDLE

SFLLVAMAYDRYVAICLPLHYATIMSPMLSRSLVALSWVLTTFHAMLHTLLMARLRF

ADNVILHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPLLLIIGSYARIVFSILK

VPSSKGICKAVSTCGSHLSVVSFLFYGTVIGLYLCPANNSTLKETVMAVMYTVMAP" (SEQ ID

NO:138).

BASE COUNT 115 a 192 c 134 g 208 t

## ORIGIN

1 cttctgtgac cttctgtct cttctgtgac cattccaaag ttgttacaga acatgcagag

61 ccaagaccca tccatccct atcggggctg cctgaccag atgtacttct tctgtattt

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181 cctcccccta cattacgcca ccatcatgag ccccatgctg tctcgctccc tggtgcgct

241 gtctgggtg ctgaccacct tccatgcat gttgcacact ttactcatgg ccagggtgctg

301 ttttgtgca gacaatgtga tctccactt tttctgtgat atgtctgctc tgctgaagct

361 ggctgtctct gacctcgag ttaatgaatt ggtgatattt atcatgggag gcctcattct

421 tgtcatccca ctctactta tcattgggtc ctacgcacga attgtcttct ccatcctcaa

481 ggcccttct tctaagggtg tctgcaaggc cgtctctact tgggtctccc acctctctgt

541 ggtgtcactg ttctatggga ctgtattgg tctctactta tgcccatcag ctaataattc

601 tactctaaag gagactgtca tggctgtgat gtacactgtg atggccccc (SEQ ID NO:139).

## OR91

LOCUS AF127904 646 bp DNA PRI 28-FEB-2000

DEFINITION *Saimiri sciureus* olfactory receptor (SSC34) gene, partial cds.

ACCESSION AF127904

## KEYWORDS

SOURCE common squirrel monkey.

ORGANISM *Saimiri sciureus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..646  
         /organism="Saimiri sciureus"  
         /db\_xref="taxon:9521"  
     gene <1..>646  
         /gene="SSC34"  
     CDS <1..>646  
         /gene="SSC34"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="LADIGFTSTTVPRITVNIQTHSRVIAYASCLTQMSFSIFFACME  
         DTLLAVMAYDRFVAICHPLHYPVIMNPRLCGFLVLVSVFLSLLISQVHNLIVLQFSCF  
         KEIKISNFFCDPSQLLTLSCSDTFVNNIVTNFFAAVFGFLPISGIFFSYYKIASILR  
         VPLSSGKYKAFSTCSSHLAVVCLFYGTGTVIGVYLGSSMASPRKSVVASVMYTVVTP" (SEQ ID  
 NO:140).  
 BASE COUNT 136 a 167 c 122 g 221 t  
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     121 tgcgtgatg gaagacacgc tctggctgt gatggcctat gaccggttg ttgccatctg  
     181 tcacccctg cactaccag tcacatgaa cccacgactc tgtggtctt tagtgttgg  
     241 gtctgtttt cttagcctt taatatcca ggtgcacaa ttgattgtc tacaatttc  
     301 ttgctcaaa gagataaaga ttctaattt ctctgtgac ccttccaac tctcacct  
     361 ttctgtttt gacaccttg tcaataacat agtcacgaat ttcttgctg ctgtattgg  
     421 tttctccc atctcaggga tcttttctc ttactataaa attgcctct ccattctgag  
     481 agttcatta tcaagtggga agtataaagc ctctccacc ttagctctc acctggcagt  
     541 tgtttgcta tttatggaa cagtattgg agtgtacct gggtcatcaa tggcatcccc  
     601 caggaagagt gtggtggcct cagtgatga cacagtgtc actccc (SEQ ID NO:141).

## OR92

LOCUS AF127905 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri boliviensis SBO64 pseudogene, partial sequence.  
 ACCESSION AF127905  
 KEYWORDS  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..649  
         /organism="Saimiri boliviensis"  
         /db\_xref="taxon:27679"  
     gene <1..>649  
         /gene="SBO64"  
         /pseudo  
 BASE COUNT 145 a 157 c 129 g 218 t  
 ORIGIN  
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     61 ggaagacaga agcatctcct tcacaggatg cgtcatgcaa ttctttttg ccagcatatt  
     121 tgtggtgaca gaaatattca tgctggcagt gatggcctat gacagatttg tgggtggtg  
     181 ttaccctctg cttcacacag ttgcaatgic ccagaggcctt ttcttttgt tagtggtctac  
     241 atcatacttc aggggtgacag tctgtttcct gacaattacc ttcttctcc tggattatc  
     301 cttcagagga aataatatca ttaataactt tgtgtgtgag cctgctgcca ttgttctgt  
     361 gccatgcttt gaccctaca tgagccagga aatcattttc atttctgcca cattcaatga  
     421 aacaagcagc ctgatgatca ttctcacctc ctaagatttc gttttatca atgtcatgat  
     481 gatgccttcc actggggggc gcataaaagc atgcgcgacc tgttctccc agctgaccgc  
     541 cattatcatt ttccatggga ccatctcttt tctctattgt gttcctaact ccaaagttc  
     601 atggctcatg gtcaaggtgg gctctatctt ttacacagtg gtcacccc (SEQ ID NO:142).

## OR93

LOCUS AF127906 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO65) gene, partial cds.  
 ACCESSION AF127906  
 KEYWORDS  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..649  
         /organism="Saimiri boliviensis"  
         /db\_xref="taxon:27679"  
     gene <1..>649  
         /gene="SBO65"  
     CDS <1..>649  
         /gene="SBO65"

09747155.122100

/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDICVTSTTIPKTLNSNIQTHSKVITYAGCVTQLYFSVLFIGLD  
SLLLTVMAYDRFVAICHPLRYMVIMNPQLCGLLVLSWIMSALHSLTESLMALSLLFC  
TDLKILHFFCELNQIIHIACSDTCLNNLVMYLSAVLLGGGFLAGILYSYSKIASSIRA  
ISSAKGKYKAFSTCASHLSVVSIFYCTGLGVYLSSAATHNSLSSTAASVMYTVVTP" (SEQ ID

NO:143).

BASE COUNT 141 a 180 c 130 g 198 t

ORIGIN

1 cttttagagc atctgtgtta cctccaccac gattccaaag acatatcaa acatccagac  
61 acacagcaaa gtcacacct atcgaggctg tgcacccag ttgtacttt ctgtactctt  
121 tatagggtg gacagcttac tctgaccgt gatggcctat gaccgattg tggccatctg  
181 tcacccctg cgtacatgg tcatcatgaa ccctcagctc tgggactgc tggttctggt  
241 gtctggatc atgagtgcct tgcattcctt gacagaaagc ttaatggcat tatcactgct  
301 cttttgtaca gactgaaaa tcttccactt tttctgtgaa cttatcaga taatccacat  
361 tgctgttct gacacctgtc ttaataacct ggtgatgtat ttgtcagctg tgcgtctggg  
421 cgggtgtct ctcgctggga tctgtactc ttacttaag atagcttct ctatcgtgc  
481 aatctcatca gctaaggga agtacaaggc atttccacc tgtgcatctc acctctcagt  
541 tgtctctta tttattgta caggcctagg ggtgtacctg agtctgctg caaccacaa  
601 ctactctca agtacagcag cctcggtgat gtactctg gtcaccccc (SEQ ID NO:144).

#### OR94

LOCUS AF127907 649 bp DNA PRI 28-FEB-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC69) gene, partial cds.

ACCESSION AF127907

KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>649

/gene="SSC69"

CDS <1..>649

/gene="SSC69"

/codon\_start=2

/product="olfactory receptor"

/translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAALD

IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQPLIVLRLSFC

TDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSIRA



ISSAQGKYKAFSTCASHILIVSLFYGTLLGAYLSSAATGNSSHSSAAALVMYTVVTP" (SEQ ID NO:145).

BASE COUNT 139 a 179 c 131 g 200 t

ORIGIN

5 1 cttttagac atctgtttg tgtctaccac tgtcccgaag atgctggtaa atatccagac  
61 acacagcaaa gtcacacct ttgcaggctg catcacccag ataggccatt gcctactctt  
121 tgcagcattg gacatcttta tgtgactgt gatggcctat gaccggtatg tggccatctg  
181 tcacccctg cactacacag tcaccattaa cccagactg tgtggactgc tggttctggc  
241 atcctggatc ctgagtggcc tgaattctc attacaacc ttaatagtgc tgcggcttcc  
10 301 cttctgcaca gacttggaat tccccactt ttctgcgaa cttaatcagg tcatacatct  
361 tgcctgttat gacactttcc ttaatgatgt ggtgatgtat ttggcagcta tgctgctggg  
421 cgggtgtccc ctacaggaa ttatttact ttactctaag atagtttct ccatacgtgc  
481 aatctcatca gctcaggga agtacaaggc gtttccacc tgtgcactc acatcttaat  
541 tgtctcctta tttatggta cactcctagg tgcgtacct agttctgctg caactggcaa  
15 601 ctacattca agtctgcag ccttggtgat gtacactgtg gtcaccccc (SEQ ID NO:146).

## OR95

LOCUS AF179716 487 bp DNA PRI 31-DEC-2000

20 DEFINITION Papio hamadryas olfactory receptor (PPA133) gene, partial cds.

ACCESSION AF179716

KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

25 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

35 TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

40 source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>487  
/gene="PPA133"  
45 CDS <1..>487  
/gene="PPA133"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC  
FCADNVIPHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLILGSYARIVSSI  
50 LKVPSSKGICKAFSTCGSHLSVVSIFYGTIIGLYFCPSANSSTLKETVMAMMYTVVTP  
ML" (SEQ ID NO:147).

BASE COUNT 82 a 141 c 107 g 157 t

ORIGIN

1 tgtggccatc tggctcccc tgcactacac cgccatcatg agcccatgc tctgtctgc

61 cctgggtggcg ctgtcctggg tgctgaccac ctccatgcc atgttacaca ctttactcat  
 121 ggccagggtg tgttttgg cagacaatgt gatcccccac ttttctgtg atatgtctgc  
 181 tctgtgaag ctggcctgct ctgacactcg agtcaatgaa ttggtgatat ttatcatggg  
 241 agggctgatt ctgtcatcc cattctact catcctggg tectatgcac ggattgtctc  
 301 ctccatctc aaggtccctt cgtctaaggg tatctgcaag gcgttctcta ctgtggctc  
 361 ccacctctct gtggtgtcac tgttctatgg gaccattatt ggtctctact tctgcccac  
 421 agctaatagt tctactctaa aggagactgt tatggctatg atgtacactg tggtagacccc  
 481 catgctg (SEQ ID NO:148).

## OR96

LOCUS AF179717 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA134) gene, partial cds.  
 ACCESSION AF179717

KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>486

/gene="PPA134"

CDS <1..>486

/gene="PPA134"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICQPLHYSTLLSPWACMAMVGTSWLTGIIATTHAFLIFSLP

FPSRPIIPHFLCDILPVLRLASAGKHRSEISVMTATVVFIMIPFSLIVTSYIRILGAI

LAMASTQSRKVFSTCSSHLLVVSLLFFGTASITYIRPQAGSSVTDRVLSVFYTVITP

ML" (SEQ ID NO:149).

BASE COUNT 85 a 181 c 97 g 123 t

ORIGIN

1 tgttgccatc tgccagcctc tgcactactc taccctcttg agcccatggg cctgcatggc  
 61 catggtgggc acctcctggc tcacagggcat catcacggcc accacccatg ccttctcat  
 121 cttctctcta ccttttccca gccgcccaat catccacac ttctctgtg acatcctgcc  
 181 agtactgagg ctggcaagtg ctgggaagca caggagcgag atctctgtga tgacagccac  
 241 ttagtcttc attatgatcc cttctctct gattgtcacc tcttatcc gcactctggg  
 301 agccatccta gcgatggcct ccaccagag ccgccgaag gtcttctcca cctgctctc  
 361 ccatctgctc gtggtctctc tcttcttgg aacagccagc atcacctaca tccggccgca  
 421 ggcaggctcc tctgtacca cagaccgcgt cctcagtgtg tctacacgg tcatcacacc

481 catgct (SEQ ID NO:150).

## OR97

5 LOCUS AF179718 487 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas PPA135 pseudogene, partial sequence.  
ACCESSION AF179718  
KEYWORDS .  
SOURCE baboon.  
10 ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 487)  
15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
25 source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>487  
/gene="PPA135"  
30 /pseudo  
BASE COUNT 112 a 140 c 89 g 146 t  
ORIGIN  
1 tgtggacatc tgaagtcctt tgcactacc agtcatcatg aacgaaagaa cacgggccaa  
61 actggctgct gcttcttggt tcccaggctt tctgtagct actgtgcaga ccacgtggct  
35 121 cttcagcttt ccattctgtg gcaccaacaa ggtgaaccac ttcttctgtg acagcccacc  
181 tgtgctgaag ctggtctgtg tagacacagc actgtttgag atctacacca tcactggaac  
241 catttgggtg gtcattgctt cctgcttgct gatctgtgt tctacactc tcattgctgc  
301 tgccatcctc aagatcccat cagctaaagg gaagcataaa gccttctcta cgtgatcctc  
361 acatctcctt gttgtctctc tttctatct atcataaac ctacacattt ttcagcctaa  
40 421 atcaaataat tctcctgaaa gcaaaaagct gctatcattg ttctacactg ttgtgactcc  
481 catgttg (SEQ ID NO:151).

## OR98

45 LOCUS AF179719 482 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas PPA136 pseudogene, partial sequence.  
ACCESSION AF179719  
KEYWORDS .  
SOURCE baboon.  
50 ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 482)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

5 REFERENCE 2 (bases 1 to 482)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

10 FEATURES Location/Qualifiers

source 1..482

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>482

15 /gene="PPA136"

/pseudo

BASE COUNT 91 a 151 c 96 g 144 t

ORIGIN

1 tgtggccatc tgccaccccc tctactatgt cacagccatg agtcctggac tctgtatctt

20 61 gctcctctgc ttgtgttggg ggctctctgt tctctatggt ctctcctca ctctcctct

121 gaccagggtg accttctgtg ggactcaaga gatccactac ctcttctgtg agatgtacgt

181 cctgtctcag ctggcatgtt ccaacaccca catcattcac acagtgtctg ttgtactgg

241 ctgctttctt cctcgacccc ttaggggtca cgactacatc ctatatacgt attgtcagaa

25 301 ccatacttca gataacctca gcctctaaga aacacaaaac ctctctgcc tgtgcctcac

361 atttgggtgt ggtctccctc tttatggga cacttggtat ggtatacctg cagccctcc

421 acacctactc catgaaggac tcagtagcca cagtgatgta tgctgtggtg acacctatga

481 tg (SEQ ID NO:152).

OR99

30

LOCUS AF179720 481 bp DNA PRI 31-DEC-2000

DEFINITION Papio hamadryas olfactory receptor (PPA137) gene, partial cds.

ACCESSION AF179720

KEYWORDS

35 SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Papio.

40 REFERENCE 1 (bases 1 to 481)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 481)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..481

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>481

/gene="PPA137"  
 CDS <1..>481  
 /gene="PPA137"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LAICQPLRYPVLMNGRLCTVLVAGAWVAGSIHGSIQATLTFRLP  
 YCGPNQVDYFICDIPAVLRLACADTTVNELVTFVDIGVVAASCFMLILLSYANIVHAI  
 LKIRTTDGRRAFFSTCGSHLTVVTVYYVPCIFIYLRAGSKSPLDGAVAVFYTVVTPFL" (SEQ

ID NO:153).

BASE COUNT 89 a 139 c 116 g 137 t

ORIGIN

1 cctggcaata tgtcaacccc tgcgctaccc agtgctcatg aatgggaggt tatgcacagt  
 61 cctgtggct ggagcttggg tgcgggctc cattcatggg tctatccagg ccacctgac  
 121 ctccgccta ccctatttg ggcccaatca ggtagattac ttatctgtg acatccctgc  
 181 agtattgaga ctggcctgtg ctgacacaac tgcaatgag ctgtgacct ttgtggacat  
 241 cggagtagtg gccgccagt gcttcattt aattctact tcctatgcca acatagtcca  
 301 tgccatctg aagatacgca ccactgatgg gagcgccgg gccttctcta cctgtggctc  
 361 ccactaact gtggtcacag tctactatgt tcctgtatt tcatctacc ttagggtg  
 421 ctccaagagc cccctggatg gggcagtggc tgtgtttac actgtgtgca ctccatctc  
 481 g (SEQ ID NO:154).

## OR100

LOCUS AF179721 487 bp DNA PRI 31-DEC-2000

DEFINITION Papio hamadryas olfactory receptor (PPA138) gene, partial cds.

ACCESSION AF179721

KEYWORDS .

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>487

/gene="PPA138"

CDS <1..>487

/gene="PPA138"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICKPLLYPVIMTNGLCIRLLVLSFVGGFLHALIHEGILFRLT

FCNSNIIHHFYCDIIPLLTISCTDPSINFLMLFILSGSIQVFTILTVLVSYAFVLFTI

LKKKSVKGIRKAFSTCGAHLFSVCLYYGPLLFMYVGPASPQADDQDMVECVFYTVIIP  
FL" (SEQ ID NO:155).

BASE COUNT 117 a 106 c 74 g 190 t

ORIGIN

5 1 ttagccata tgcaaacctt tactttatcc agtgattatg accaatggac tgtgcatccg  
61 gctattatgc ttgtcatttg taggtggcctt ccttcacgcc ttaattcatg aaggcatttt  
121 attcagatta accttctgta attctaacaat aatacatcac tttactgtg acattatccc  
181 attgttaacg atttctctga ctgacccttc tattaatttt ttaatgcttt ttattttgtc  
241 tggttcaata caggatttca ctattttgac tgttcttgtc tcttatgcat ttgcctctt  
10 301 tacaattctta aaaaaaaagt cagtcaaagg cataaggaaa gcctttcca cctgtggagc  
361 ccattctctc tctgtctgtt tatactatgg cccctctc tcatgtatg tgggcctgc  
421 attccacaa gcagatgatc aagatattgt agagtgtgta tttacacg tcatcattcc  
481 ttctta (SEQ ID NO:156).

15 **OR101**

LOCUS AF179722 487 bp DNA PRI 31-DEC-2000

DEFINITION Papio hamadryas olfactory receptor (PPA139) gene, partial cds.

ACCESSION AF179722

20 KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

25 Papio.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

30 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

35 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

40 gene <1..>487

/gene="PPA139"

CDS <1..>487

/gene="PPA139"

/codon\_start=2

45 /product="olfactory receptor"

/translation="VAICNPALLYMVVVSRRLLVSLTYLYGFSTAIVVSPCIFSMS

YCSSNIINHFYCDIAPLLALSCSDTYLPEAIVFISAAATNLVFSMITVLVSFYFNIVLSI

LRMHSSEGRKKAFSTCASHMMAVTVFYGTMLFMYLQPQTNHSLDTDKMASVFYTLVIP

ML" (SEQ ID NO:157).

50 BASE COUNT 110 a 111 c 85 g 181 t

ORIGIN

1 tgtggccatt tgtaaccctc tgctctacat ggtgggtgtg tctcggcggc tctgcctcct

61 gctgtgtctcc ctacatacc tctatggcct ttctacagct attgtgggtt cacctgtat

121 attctctatg tcttattgct ctctaataat aatcaatcat tttactgtg atattgcacc

181 tctgtagca ttatcttgc ctgatactta cttaccagaa gcaatagtct tcatactgc  
 241 agcaacaaat ttggttttt ccatgattac agttctagta tcttattca atattgttt  
 301 gtccattcta aggatgcatt catcagaagg aaggaaaaaa gcctttcca cctgtgcttc  
 361 acatatgatg gcagtcacag ttttctatgg gacaatgctg ttcattgatt tgcagcccca  
 421 aaccaaccac tcaactggata ctgataagat ggcttctgtg tttacacat tggtgattcc  
 481 tatgctg (SEQ ID NO:158).

## OR102

10 LOCUS AF179723 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA140) gene, partial cds.  
 ACCESSION AF179723  
 KEYWORDS .  
 SOURCE baboon.  
 15 ORGANISM Papio hamadryas  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 487)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 30 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"  
 gene <1..>487  
 /gene="PPA140"  
 35 CDS <1..>487  
 /gene="PPA140"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC  
 40 FCADNVIPHFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLILGSYARIVSSI  
 LKVPSSKGICKAFSTCGSHLSVVSIFYGTIIGLYFCPSANSSTLKETVMGMMYTVVTP  
 ML" (SEQ ID NO:159).  
 BASE COUNT 82 a 141 c 108 g 156 t  
 ORIGIN  
 45 1 tgtggccatc tgttccccc tgcactacac cgccatcatg agccccatgc tctgtctcgc  
 61 cctggtggcg ctgtcctggg tgctgaccac ctccatgcc atgttacaca ctttactcat  
 121 ggccagggtg tgttttgcg cagacaatgt gatccccac ttttctgtg atatgtctgc  
 181 tctgtgaag ctggcctgct ctgacactcg agtcaatgaa ttggtgatat ttatcatggg  
 241 agggctgatt ctgtcatcc cattctact catcctggg tctatgcac ggattgtctc  
 50 301 ctccatctc aaggctccct cgtctaaggg tatctgcaag gcgttcteta ctgtggctc  
 361 ccacctctct gtggtgtcac tgttctatgg gaccattatt ggtctctact tctgcccac  
 421 agctaatagt tctactctaa aggagactgt tatgggtatg atgtacactg tggtgacccc  
 481 catgctg (SEQ ID NO:160).

## OR103

LOCUS AF179724 478 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA142) gene, partial cds.

ACCESSION AF179724

KEYWORDS .

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Papio.

REFERENCE 1 (bases 1 to 478)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 478)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..478

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>478

/gene="PPA142"

CDS <1..>478

/gene="PPA142"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICKPLNYATIMSQPMCGFLMGVAGILGFVHGGIQTFLFIAQLP

FCGPNVIDHFMCIDLVLLELACTDTHTLGPLIAANSGLCFLIFSMLVASVVIILCSL

RTHISEGRHKALSSCTSHIFVVILFFVPCSYLYLRPLTSFPTDKAVTVFCTLFTPML"

(SEQ ID NO:161).

BASE COUNT 93 a 126 c 98 g 161 t

ORIGIN

1 tgtggccatc tgaagccct tgaactatgc aaccatcatg agtcaacctt tgtgtggatt

61 cctgatgggg gtggctggga ttctgggatt tgtgcatgga ggatccaga ctctgttcat

121 agcccagtta ccattctgtg gcccattgt catcgaccac ttatgtgtg atttagtacc

181 tcttctagag ctggcctgca cagacactca caccttgggg cctctgatag ctgccaacag

241 tggatcattg tgttctctca tttttccat gctggtgct tcctatgca tcacctctgt

301 ctccctaagg actcatatct ctgaagggcg tcacaaagct ctgtctagtt gtacctctca

361 tatctttgtt gtcatttat tctttgtccc ttgtcatac ctgtatctaa gacctctaac

421 ctcttcccc actgacaaag ctgtgactgt gtttgcacc ctatttacac ctatgttg (SEQ ID NO:162).

## OR104

LOCUS AF179725 487 bp DNA PRI 31-DEC-2000

DEFINITION Papio hamadryas olfactory receptor (PPA143) gene, partial cds.

ACCESSION AF179725

KEYWORDS .

SOURCE baboon.

ORGANISM Papio hamadryas



Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Papio hamadryas"

/db\_xref="taxon:9557"

gene <1..>487

/gene="PPA143"

CDS <1..>487

/gene="PPA143"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICKPLHYLNIMNRRVCTLLVFTSWLVSFLIIFPALMLLLQLD

YCRSNIMDHFTCDYFPLLQLACSDTKFLEVMGFSCAVFTLMLTLALIFLSYIYIIRTI

LRIPSASQRTKAFSTCSSHMIVISISYGCIFMYIKPSAKDRVSLSKGVAILNTSVAP

ML" (SEQ ID NO:163).

BASE COUNT 120 a 110 c 85 g 172 t

ORIGIN

1 tgtggccatc tgcaagcctc tgcattactt gaatatcatg aatcgaagag tctgcacact

61 gctgtttt acttctggc tggttcatt ctaatacata ttcccagcac tcatgtgct

121 ctacagctt gattactgta ggtctaata tatggaccat ttacctgtg attatttcc

181 cctgctgcaa ctgcttggt cagacacaaa attcctagag gtgatgggat ttctgtgct

241 tgtgtttact ctaatgttga cttggcatt aatattctg tctacatat acattatcag

301 aacaatttg agaattcct ctgctagtca aaggacaaag gcctttcca catgttcttc

361 ccacatgatt gtcatttcca tctctatgg cagctgcatt ttatgtaca ttaaacctc

421 agcaaaagat agagtgtcct tgagcaagg agtggaata ctaaaccct cagtagcccc

481 catgctg (SEQ ID NO:164).

## OR105

LOCUS AF179726 487 bp DNA PRI 31-DEC-2000

DEFINITION Papio hamadryas olfactory receptor (PPA144) gene, partial cds.

ACCESSION AF179726

KEYWORDS .

SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Papio.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>487  
/gene="PPA144"  
CDS <1..>487  
/gene="PPA144"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICQPLHYSTLLSPWACMAMVGTSWLTGHIITATTHAFLIFSLP  
FPSRPIIPHFLCDILPVLRLASAGKHRSEISVMTATVVFIMIPFSLIVTSYIRILGAI  
LAMASTQSRRKVFSTCSSHLLVVSLLFFGTASITYIRPQAGSSVTTDRVLSLFYTVITP  
ML" (SEQ ID NO:165).  
BASE COUNT 85 a 184 c 95 g 123 t  
ORIGIN  
1 tgttgccatc tgcagcctc tgcactactc taccctcttg agcccatggg cctgcatggc  
61 catggtgggc acctcctggc tcacagcatc catcacggcc accacccatg cttctctcat  
121 ctctctcta cttttccca gccgccaat catccacac ttctctgtg acatcctgcc  
181 agtactgagg ctggcaagtg ctgggaagca caggagcgag atctctgtga tgacagccac  
241 tgtagtcttc attatgatcc cttctctctt gattgtcacc tcttatcc gcctcctggg  
301 agccatccta gcgatggcct ccaccagag ccgccgcaag gtcttctcca cctgctcctc  
361 ccatctgctc gtggtctctc tctctttgg aacagccagc atcacctaca tccggccgca  
421 ggcaggtccc tctgtacca cagaccggt cctcagtctc ttctacagg tcatcacacc  
481 catgctc (SEQ ID NO:166).

# OR106

LOCUS AF179727 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR183) gene, partial cds.  
ACCESSION AF179727  
KEYWORDS  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487

/organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 gene <1..>487  
 /gene="PTR183"  
 5 CDS <1..>487  
 /gene="PTR183"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICFPLHYTAIMSPMLCLS VVTL SWVLTTFHAMLHTLLMARLC  
 10 FCADNVIPHFCDMSALLKLACSDTRVNEWVIFIMGGLIVVIPFLILGSYARIVSSI  
 LKVPSSKGICKALSTCGSHLSVVSIFYGTVIGLYLCPSANSSTLKDTVMAMMYTVVTP  
 ML" (SEQ ID NO:167).

BASE COUNT 86 a 137 c 105 g 159 t

#### ORIGIN

1 tgtggccatc tgttcccc tgcactac cgccatcatg agcccatgc tctgtctc  
 61 cgtggtgacg ctgtcctggg tgctgaccac ctccatgcc atgttacaca cttactcat  
 121 ggccagggtg tgttttgg cagacaatgt gatccccac ttttctgtg atatgtctgc  
 181 tctactgaag ctggcctgct ctgacactcg agttaatgaa tgggtgatat ttatcatggg  
 241 agggctcatt gttgtcatcc cattctact catcctggg tcctatgcaa gaattgtctc  
 301 ctccatcctc aaggctcctt cttctaaggg tatctgcaag gcctgtgcta cttgtggctc  
 361 ccacctgtct gtggtgtcac tgttctatgg gaccgttatt ggtctctact tatgcccatc  
 421 agctaatagt tctactctaa aggacactgt catggctatg atgtacactg tggtgacccc  
 481 catgctg (SEQ ID NO:168).

#### OR107

LOCUS AF179728 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR203) gene, partial cds.  
 ACCESSION AF179728  
 30 KEYWORDS .  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 35 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 40 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 45 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 gene <1..>487  
 /gene="PTR203"  
 50 CDS <1..>487  
 /gene="PTR203"  
 /codon\_start=2  
 /product="olfactory receptor"

/translation="VAICFPLHYTAIMSPMLCLSVVALSWVLTTFHAMLHTLLMARLC  
FCADNVIPHFFCDMSALLKLACSDTRVNEWVIFIMGGLIVVIPFLLILGSYARIVSSI  
LKVPSKIGICKALSTCGSHLSVVSFLFYGTVIGLYLCPANSSTLKDVTMMAMMYTVVTP  
ML" (SEQ ID NO:169).

BASE COUNT 85 a 137 c 106 g 159 t  
ORIGIN

1 tgtggccatc tgttcccc tgcactacac cgccatcatg agcccatgc tctgtctc  
61 cgtgggtggc ctgtcctggg tctgaccac ctccatgcc atgttacaca cttactcat  
121 ggccagggtg tgttttgg cagacaatgt gatccccac ttttctgtg atatgtctgc  
181 tctactgaag ctggcctgct ctgacactcg agttaatgaa tgggtgatat ttatcatggg  
241 agggctcatt gttgcatcc cattcctact catcctggg tcctatgcaa gaattgtctc  
301 ctccatcctc aaggccctt cttctaaggg tatctgcaag gcctgtcta cttgtggctc  
361 ccacctgtct gtggtgtcac tgttatgg gaccgtatt ggtctctact tatgcccatc  
421 agctaatagt tctactctaa aggacactgt catggctatg atgtacactg tggtgacccc  
481 catgctg (SEQ ID NO:170).

## OR108

LOCUS AF179729 485 bp DNA PRI 31-DEC-2000

DEFINITION Pan troglodytes PTR204 pseudogene, partial sequence.

ACCESSION AF179729

KEYWORDS

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..485

/organism="Pan troglodytes"

/db\_xref="taxon:9598"

gene <1..>485

/gene="PTR204"

/pseudo

BASE COUNT 130 a 107 c 77 g 171 t

ORIGIN

1 tgtagccata tgtaatccct tgctttatcc agtggatgatg tccaacaaac tcagcgctca  
61 gttgctaagc attcatatg taattggtt cctgcatcct ctgggtcatg tgagtttact  
121 attgcgacta accttctgca ggttaacat aatacattat ttctactgtg aaattttaca  
181 actgttcaaa atttcatgca atggccatc tattaacgca ctaatgatat ttatttttgg  
241 tgcttttata caaataccca ctttaatgac gatcataatc tcttatactc gtgtgtctct  
301 tgatattctg aaaaaaagt ctgaaaaggg cagaagcaaa gccttctcca catgcagcgc  
361 ccactctgct tctgtctcat tgctacgga aactctgac ttcatgatg tgcgtcctgc  
421 atctggctta gctgaagacc cagacaaagt gtattctctt ttacacgatt ataattcccc  
481 tgcta (SEQ ID NO:171).

## OR109

LOCUS AF179730 487 bp DNA PRI 31-DEC-2000  
5 DEFINITION Pan troglodytes olfactory receptor (PTR205) gene, partial cds.  
ACCESSION AF179730  
KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
15 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Pan troglodytes"  
25 /db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR205"  
CDS <1..>487  
30 /gene="PTR205"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICRPLCYSTVTRPQVCALMLALCWVLTNIIALHTFLMARLS  
FCVTGEIAHFFCDITPVCLKSCSDTHINEMMVFLGGTVLIVPFLCIVTSYIHIVPAI  
LRVTRGGVGKAFSTCSSHLCVVCVFYGTFLFSAYLCPPSIASEEKDIAAAAMYTIVTP  
35 ML" (SEQ ID NO:172).  
BASE COUNT 83 a 148 c 110 g 146 t  
ORIGIN  
1 tgtggccatt tgcgcccc tctgtactc cacagtcacg aggccccaag tctgtgccct  
61 aatgcttgca ttgtctggg tctcaccaa tatcattgcc ctgactcaca cgttctcat  
40 121 ggctcgggtg tcttctgtg tgactgggga aattgctcac ttttctgtg acatcactcc  
181 tgtcctgaag ctgtcatgtt ctgacacca catcaacgag atgatgggtt ttgtctggg  
241 aggcaccgta ctcatgtcc ccttttatg cattgtcacc tctacatcc acattgtgcc  
301 agctatcctg aggggtccgaa cccgtggtgg ggtgggcaag gcctttcca cctgcagttc  
361 ccacctctgc gttgtttgtg tgttctatgg gacgctctc agtgcctacc tgtgtcctc  
45 421 ctccattgcc tctgaagaga aggacattgc agcagctgca atgtacacca tagtgactcc  
481 catgttg (SEQ ID NO:173).

## OR110

50 LOCUS AF179731 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR206) gene, partial cds.  
ACCESSION AF179731  
KEYWORDS .  
SOURCE chimpanzee.

ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 gene <1..>487  
 /gene="PTR206"  
 CDS <1..>487  
 /gene="PTR206"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYSTIMALRLCASLVAAPWVIAILNPLLHTLMM AHLH  
 FCSDNVIHHFFCDINSLPLSCSNTSLNQLSVLATVGLIFVVPVCILVSYILIVSAV  
 MKVPSAQGKLKAFSICGSHLALVILFYGAITGVYMSPLSNHSTEKDSAASVIFMVVAP  
 VL" (SEQ ID NO:174).

BASE COUNT 90 a 138 c 91 g 168 t

ORIGIN  
 1 cgtggccatc tgcaccctt tacattactc caccattatg gccctgcgcc tctgtgctc  
 61 tctgtagct gcaccttggg tcattgccat ttgaaccct ctctgcaca ctctatgat  
 121 ggcccatctg cactctgct ctgataatgt tatccaccat ttctctgtg atatcaactc  
 181 tctcctccct ctgtcctgtt ccaacaccag tcttaacag ttgagtgtc tggctacggt  
 241 ggggctgac ttgtgtgac ctctagtggt tctctggtg tctatatcc tcattgttc  
 301 tgctgtgatg aaagtccctt ctgcccaagg aaaactcaag gctttctcta tctgtggatc  
 361 tcaccttggc ttggctcatc ttctctatgg agcaatcaca ggggtctata tgagcccctt  
 421 atccaatcac tctactgaaa aagactcagc cgcacagtc attttatgg ttgtagcacc  
 481 tgtgttg (SEQ ID NO:175).

**OR111**

LOCUS AF179732 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR207) gene, partial cds.  
 ACCESSION AF179732  
 KEYWORDS  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Pan troglodytes"  
         /db\_xref="taxon:9598"  
     gene <1..>487  
         /gene="PTR207"  
     CDS <1..>487  
         /gene="PTR207"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAVCNPLLYTVAMYQRLCSLLVATSYCWGRVCSLTLTYFLELS  
         FRGNNIINNfVCEHAAIVAVSCSDPYVSQEITLVSATFNEISSLVITLTSYAFIFITV  
         MKTASIGGRKKAFFTCASHLTAITIFHGTLFLYCVPSKSSWLMVKVASVFYTVVIP  
         ML" (SEQ ID NO:176).

BASE COUNT 99 a 122 c 103 g 163 t

#### ORIGIN

1 tgtggcgggtg tgtaaccctc ttctctacac agttgcaatg taccagaggc ttgtctcct  
 61 gttggtggct acatcatact gttgggggag agtctgttcc ctgacactta cctactttct  
 121 actggaatta tccttcagag gaaataatat cattaataac ttgtctgtg agcatgctgc  
 181 cattgttgc gtgtcttgc ctgacccta tgtgagccag gagatcactt tagtttctgc  
 241 cacattcaat gaaataagca gcctgggat cactctcact tcctatgctt tcattttat  
 301 cactgtcatg aagacggctt ccattggggg gcgcaagaaa gcgttctca cgtgtgcctc  
 361 ccacttgacg gccattacca tttccatgg gactattctt ttctctact gtgttctaa  
 421 ctccaaaagt tcgtggctca tggtaaggt ggctctgtc tttacacag tggtcattcc  
 481 catgctg (SEQ ID NO:177).

#### OR112

LOCUS AF179733 481 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR208) gene, partial cds.  
 ACCESSION AF179733  
 KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 481)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 481)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

    source 1..481  
         /organism="Pan troglodytes"

gene /db\_xref="taxon:9598"  
<1..>481  
/gene="PTR208"  
CDS <1..>481  
/gene="PTR208"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="LAICQPLRYPVLMNGRLCTVLVAGACVAGSMHGSIQATLTFRLP  
YCGPNQVDYFICDIPAVLRLACADTTVNELVTFVDVGVAASCFMLILLSYANIVNAI  
LKIRTTDGRHRAFSTCGSHLIVVTVYYVPCIFIYLRAGSKGPLDGAAAVFYTVVTPLL"

(SEQ ID NO:178).

BASE COUNT 85 a 141 c 124 g 131 t  
ORIGIN

1 cctggcaata tgcagcccc tgcgtaccc agtgctcatg aatgggaggt tatgcacagt  
61 ccttggtgct ggagctgtg tcgccggctc catgcatggg tctatccagg ccaccctgac  
121 ctccgcctg ccctactgtg ggccaatca ggtggattac ttatctgtg acatccccgc  
181 agtattgaga ctggcctgtg ctgacacaac tgtcaatgag cttgtgacct ttgtggacgt  
241 cgggggtggtg gccgccagtt gcttcatgtt aattctgctc tcgtatgcca acatagtaaa  
301 tgccatcctg aagatacgca ccactgatgg gaggcaccgg gccttctcca cctgtggctc  
361 ccacctaatc gtgtcacag tctactatgt cccctgtatt ttcatctacc ttagggctgg  
421 ctccaaaggc ccctctgatg gggcggcggc tgtgttttac actgtgtgca ctccattact  
481 g (SEQ ID NO:179).

### OR113

LOCUS AF179734 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR209) gene, partial cds.  
ACCESSION AF179734  
KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR209"  
CDS <1..>487  
/gene="PTR209"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLYRVIVNPRLCGLLVLVSWFLSLSYSLLIQLLMQVS"



FCTSWVIQHFYCELAQVLTLCSDTHVNYILLYVVTGLLDVFPFSGILFSYTQIVSYI

LRISSTDGKHKAFSTCGSHLFVVSLFYGTGLGVYLSSNASSSSWWGMVASVMYTVVTP

ML" (SEQ ID NO:180).

5 BASE COUNT 79 a 144 c 107 g 157 t  
ORIGIN

1 cgtggccatc tgcaccccc tgtactaccg tgcatcgtg aacccccgcc tctgtggcct  
61 gctggttctt gtgtcctggg tctcagctt gtcatactcc ctgatccaga gtctgttgat  
121 gctgcagggt tcctctgta ccagttgggt cattcagcac tttactgtg agcttgctca  
10 181 ggtcctcagc cttaactgct cagacacaca cgtaattac atcctgctgt acgtggtgac  
241 tggccttctg gactttgtgc ccttctcagg gatccttttc tctacaccc aaattgtctc  
301 ctacatccta agaattcat ccacagatgg gaaacacaaa gccttttcta cctgtggatc  
361 tcatctgttt gtggtttctt tattctatgg gacaggcctt ggtgtgtatc ttagttcaa  
421 tgcacgtcc tctcctggg ggggcatggg ggcctcggtc atgtacactg tggtcacccc  
15 481 catgctg (SEQ ID NO:181).

### OR114

LOCUS AF179735 487 bp DNA PRI 31-DEC-2000

20 DEFINITION Pan troglodytes olfactory receptor (PTR210) gene, partial cds.

ACCESSION AF179735

KEYWORDS

SOURCE chimpanzee.

ORGANISM Pan troglodytes

25 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

35 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

40 /organism="Pan troglodytes"  
/db\_xref="taxon:9598"

gene <1..>487

/gene="PTR210"

CDS <1..>487

45 /gene="PTR210"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICNPLLYPVMMMSNKLSAQLLSISYVIGFLHPLVHVSLLRLT

FCRFNIIHYFYCEILQLFKISCNGPSINALMIFIFGAFIQIPTLMTHIISYSRVLFDI

LKKKSEKGRSKAFSTCSAHLSSVSLYYGTLIFMYVRPASGLAEDPKVYSLFYTHIIP

50 LL" (SEQ ID NO:182).

BASE COUNT 129 a 107 c 78 g 173 t

ORIGIN

1 ttagccata tgtaatccct tgcttatcc agtgatgatg tccaacaaac tcagcgctca

61 gttgctaagc attcatatg taattgggtt cctgcatcct ctggttcata tgagtttact

09747155-122100

121 attgcgacta actttctgca ggttaacat aatacattat ttctactgtg aaattttaca  
181 actgttcaaa atttcagca atggccatc tattaacgca ctaatgatat ttattttgg  
241 tgcctttata caaataccca cttaatgac gatcataatc tcttattctc gtgtgctctt  
301 tgatattctg aaaaaaaagt ctgaaaaggg cagaagcaaa gcctttcca catgcagcgc  
361 ccatctgctt tctgtctcat tgtactacgg aactctgac ttcagtatg tgcgtcctgc  
421 atctggctta gctgaagacc cagacaaagt gtattctctg ttttacacga ttataattcc  
481 cctgcta (SEQ ID NO:183).

**OR115**

LOCUS AF179736 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR211) gene, partial cds.  
ACCESSION AF179736  
KEYWORDS

SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..487  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR211"  
CDS <1..>487  
/gene="PTR211"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLRYTVLMNIHFCGLLILLSRFMSTMDALVQSLMIFQLS  
FCKNVEIPLFFCEVVQVIKLACSDTLINNILIYFASSIFGAIPLSGIIFSYSQIVTSV  
LRMPSARGKYKAFSTCGCHLSVFSLFYGTAFGVSISSAVAESSRITAVGSVMYTVVPQ  
MM" (SEQ ID NO:184).

BASE COUNT 102 a 120 c 98 g 167 t  
ORIGIN

1 tgtggccatt tgccaccac tgaggtacac agtctcatg aacatccatt tctgcggctt  
61 gctgattctt ctctccagg tcatgagcac tatggatgcc ctggttcaga gtctgatgat  
121 attcagctg tcttctgca aaaacgtga aatcccttg ttcttctgtg aagtcgttca  
181 ggtcatcaag ctgcctgtt ctgacaccct catcaacaac atcctcatat attttgcaag  
241 tagcatattt ggtgcaattc ctctctctgg aataatttc tcttattctc aaatagtcac  
301 ctctgttctg agaatgcat cagcaagagg aaagtataaa gcgttttcca cctgtggctg  
361 tcacctctct gtttttctt tgttctatg gacagctttt ggggtgtcca ttagttctgc  
421 tgttgctgag tcttcccgaa ttactgctgt ggggtcagtg atgtacactg tgggtccaca  
481 aatgatg (SEQ ID NO:185).

## OR116

LOCUS AF179737 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR212) gene, partial cds.  
ACCESSION AF179737  
KEYWORDS .  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR212"  
CDS <1..>487  
/gene="PTR212"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYTVIMREELCVFLVAVSWILSCASSLSHTLLLTRL  
FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
LRVPSTKGIHKALSTCGSHLSVVSLLYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP  
ML" (SEQ ID NO:186).  
BASE COUNT 87 a 141 c 105 g 154 t  
ORIGIN  
1 tgttgccata tgtcacctc tccactacac tgtcatcatg agggaagagc tctgtgtctt  
61 cttagtggct gtatcttggg ttctgtcttg tgccagctcc ctcttcaca ccttctcct  
121 gaccggctg tctttctgtg ctgcgaacac catcccccattgttctgtg accttgctgc  
181 cctgtcaag ctgtcctgct cagatatctt cctcaatgag ctggctcatgt tcacagtagg  
241 ggtgggtggtc attaccctgc cattcatgtg tatcctggta tcatatggct acattggggc  
301 caccatcctg aggggtccctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
361 ccatctctct gtgggtgtct tctattatgg gtcaatattt ggccagtacc tttcccgac  
421 tgtaagcagt tctattgaca aggatgtcat tgtggctctc atgtacacgg tggtcacacc  
481 catgttg (SEQ ID NO:187).

## OR117

LOCUS AF179738 484 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar HLA121 pseudogene, partial sequence.  
ACCESSION AF179738  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..484  
15 /organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>484  
/gene="HLA121"  
/pseudo

20 BASE COUNT 88 a 145 c 118 g 133 t  
ORIGIN  
1 tgtggctatc tgccgtccgc ttaggtatcc agagctcatg agtgggcaga cctgcatgca  
61 gatggcagca ctgagctggg ggacaggctt tgccaactca ctgctacagt ccatcctgt  
25 121 ctggcgctc ctttctgtg gccacaacgt catcaaccac ttttctgtg agatcttggc  
181 agtgctaaaa ctggcctgtg gggacatctc cctcaatgcg ctggcattaa tgggtggccac  
241 agctgtcctg acactggccc ccctcttctc catctgcctg tcttacctt tcattctgtc  
301 tgccatcctt aggttacctt ctgctgcagg cggcgcaaa gccttctcca cctgctcagc  
361 ccacctcaca gtggtgtgtg tttttaagg gacaattcc tcatgtact tcaaaccaca  
421 ggccaaggac cccaacgtgg ataagattgt tgcattgtg tatggggtg tgacaccctc  
30 481 gctg (SEQ ID NO:188).

**OR118**

35 LOCUS AF179739 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA122) gene, partial cds.  
ACCESSION AF179739  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..487  
/organism="Hylobates lar"

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/db_xref="taxon:9580"
gene    <1..>487
        /gene="HLA122"
CDS     <1..>487
5       /gene="HLA122"
        /codon_start=2
        /product="olfactory receptor"
        /translation="VAVCNPLLYTVAMSQRLCSLLVATSYSWGIVCFLTLTYFLELS
10      FRGNNIINN FVCEHAAIVAVSCSDPYVSQEITLVSATFNEISSLMMIFTSYAFIFITV
        MKMPSTGGRKKAFASTCASHLTAITIFHGTLFPYCVPSKSSWLMVKVTSVFYTVFIP
        MV" (SEQ ID NO:189).

```

BASE COUNT 101 a 124 c 97 g 165 t  
ORIGIN

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15      1 tgtggcgggtg tgtaaccctc ttctctacac agttgcaatg tcccagaggc ttgtctcctt
        61 gttgttgct acatcatact ctgggggat agtctgttc ctgacctta cctactttct
        121 actggaatta tccttcagag gaaataatat cattaataac ttgtctgtg agcatgctgc
        181 cattgttgc gtgtcttgc ctgacccta tgtgagccag gagatcactt tagtttctgc
        241 cacattcaat gaaataagca gtctgatgat gattttcact tcctatgctt tcattttat
        301 cactgtcatg aagatgcctt ccactggggg gcgcaagaaa gcgttctcca cgtgtgcctc
20      361 ccacctgacc gccattacca tttccatgg gactatectt tcccctact gtgttctaa
        421 ctccaaaagt tcatggctca tggtaaggt gacctctgc ttttacacag tgttcattcc
        481 catggtg (SEQ ID NO:190).

```

# OR119

```

25      LOCUS   AF179740  486 bp  DNA      PRI    31-DEC-2000
        DEFINITION Hylobates lar olfactory receptor (HLA123) gene, partial cds.
        ACCESSION  AF179740
        KEYWORDS
30      SOURCE   common gibbon.
        ORGANISM  Hylobates lar
                Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
                Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.
        REFERENCE 1 (bases 1 to 486)
        AUTHORS   Giorgi,D.G. and Rouquier,S.P.
        TITLE     The olfactory receptor gene repertoire in primates and mouse:
                Evidence for reduction of function in primates
        JOURNAL    Unpublished
40      REFERENCE 2 (bases 1 to 486)
        AUTHORS   Giorgi,D.G. and Rouquier,S.P.
        TITLE     Direct Submission
        JOURNAL    Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
                1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
        FEATURES   Location/Qualifiers
45      source    1..486
                /organism="Hylobates lar"
                /db_xref="taxon:9580"
        gene       <1..>486
                /gene="HLA123"
50      CDS       <1..>486
                /gene="HLA123"
                /codon_start=2
                /product="olfactory receptor"
                /translation="VAICHPLHYATIMSQSQCVMVLVAGSWVIACACALLHTLLLAQLS

```

FCADHIIPHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSTCGSHLSVVITYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
M" (SEQ ID NO:191).

BASE COUNT 95 a 144 c 93 g 154 t

ORIGIN

1 tgtggccatc tgtcaccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctgggtgct gggctcctggg tcacgcttg tgcgtgtgct ctttgcata ccctcctcct  
121 ggcccagctt tcctttgtg ctgaccacat catccctcac ttctctgtg accttggtgc  
181 cctgctcaag ttgtcctgct cagatacctc cctcaatcag ttggcaatct ttacagcagg  
241 attgacagcc attatgcttc cattctgtg catcctggtt tcttatggc acattggggt  
301 caccatcctc cagattccct ctaccaaggg catatgcaaa gccttgcca ctgtggatc  
361 ccacctctca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
481 catgtt (SEQ ID NO:192).

## OR120

LOCUS AF179741 487 bp DNA PRI 31-DEC-2000

DEFINITION Hylobates lar olfactory receptor (HLA124) gene, partial cds.

ACCESSION AF179741

KEYWORDS

SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Hylobates lar"

/db\_xref="taxon:9580"

gene <1..>487

/gene="HLA124"

CDS <1..>487

/gene="HLA124"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICSPLHYPVIMNQRTRAKLAAASWFGFPVATVQTTWLFSFP

FCGTNKVNHFFCDSPVLRRLVCADTALFEIYAIVGTILVVMIPCLLILCSYTHIAAAI

LKIPSAKGKNAFSTCSSHLLVVSIFYISLSTYFRPKSNNSPGKKLLSLSYTVVTP

ML" (SEQ ID NO:193).

BASE COUNT 102 a 141 c 96 g 148 t

ORIGIN

1 tgtggccatc tgtagtcctc tgcactaccc agtcacatg aaccaaagga ctcgtgccaa  
61 actggctgct gcctcctggt tcccaggctt tctgtagct actgtgcaga ccacatggct  
121 cttcagtttt ccattctgtg gcaccaacaa ggtaaaccac ttctctgtg acagcccgcc

181 tgtgctgagg ctggtctgtg cagacacagc actgtttgag atctacgcca tcgtcggaac  
 241 cattctgggt gtcgatgcc ctgcttgct gatcttgtgt tctatactc acattgctgc  
 301 tgccatcctc aagatcccat cggctaaagg gaagaataaa gccttctcta cgtgttcctc  
 361 acacctcctt gttgtctctc tttctatat atcattaagc ctcacatatt ttcggcctaa  
 421 atcaaataat tctcctgagg gcaagaagct gctatcattg tctacactg ttgtgactcc  
 481 catgttg (SEQ ID NO:194).

## OR121

10 LOCUS AF179742 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA125) gene, partial cds.  
 ACCESSION AF179742  
 KEYWORDS  
 SOURCE common gibbon.  
 15 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 487)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..487  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>487  
 /gene="HLA125"  
 35 CDS <1..>487  
 /gene="HLA125"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYLNIMNRRVCILLVFTSWLISFLIIFPALMLLLKLD  
 YCRSNIIDHFTCDYFLLQLACSDTKFLEVMAFSCAVFTLMFTLALISLSYIYIIRTI  
 40 LRIPSTSQRTKAFSTCSSHMVVISISYGSCIFMYIKPSAKDRVSLSKGVAILNTSVAP  
 MM" (SEQ ID NO:195).  
 BASE COUNT 121 a 107 c 82 g 177 t  
 ORIGIN  
 45 1 tgtggccatc tgcaagcctc tgcattactt gaatatcatg aatcgaagag tctgcatact  
 61 gcttgttttt acttcttggc tgatttcatt cttaatcata ttcctgcac tcatgttgct  
 121 cttaaagctt gattactgta ggtctaatat tattgacat ttacctgtg attattttcc  
 181 cctgctgcaa ctgcttggtt cagacacaaa attcttagag gtgatggcat tttcttgctc  
 241 tgtgtttact ctaatgttca ctttggcatt aatatctctg tctacatat acattatcag  
 301 aacaattttg agaattcctt ctactagtca gaggacaaag gcctttcca catgttcttc  
 50 361 ccacatggtt gttatttcca tctcttatgg cagctgcatt ttatgtaca ttaaacctc  
 421 agcaaaagat agagtgtcct tgagcaaggg agtggcaata ctaaacacct cagtagcccc  
 481 catgatg (SEQ ID NO:196).

## OR122

LOCUS AF179743 484 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA126) gene, partial cds.  
ACCESSION AF179743  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..484  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>484  
/gene="HLA126"  
CDS <1..>484  
/gene="HLA126"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYTVIMREELCVFLVAISWILSCASSLSHTLLLTRL  
FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
LRVPSTKGIHKASTCGSHLSVVSLLYYGSI FGQYLFPTASSIDKDVIVAVMYTVITPM  
L" (SEQ ID NO:197).  
BASE COUNT 88 a 143 c 104 g 149 t  
ORIGIN  
1 tgttgccata tgtcaccctc tccactacac tgcacatcg agggaagagc tctgtgtctt  
61 cttagtggtc atactcttga ttctgtcttg tgccagctcc ctctctcaca cccttctcct  
121 gacccggctg tctttctgtg ctgcgaacac catcccccac gtcttctgtg acctgtgtgc  
181 cctgctcaag ctgtcctgct cagatatctt cctcaatgag ctggtcatgt tcacagtagg  
241 ggtggtggc attacctgc cattcatgtg tatcctggta tcatatggct acattggggc  
301 caccatcctg agggtcctt caaccaaagg gatccacaaa gcgtccacgt gtggtccca  
361 tctttctgtg gtgtctctct attatgggtc aatattggc cagtaccttt tcccgaccgc  
421 aagcagttcc atgacaagg atgtcattgt ggctgtcatg tacacagtga tcacacccat  
481 gttg (SEQ ID NO:198).

## OR123

LOCUS AF179744 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA127) gene, partial cds.  
ACCESSION AF179744  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar



Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..487  
15 /organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>487  
/gene="HLA127"  
CDS <1..>487  
20 /gene="HLA127"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLLAQLS  
25 FCADHIIIPHFFCDLGLKLSLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSICGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:199).

BASE COUNT 95 a 143 c 94 g 155 t

ORIGIN  
1 tgtggccatc tgtcaccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
30 61 gctggtggt gggctcctggg tcacgcttg tgcgtgtgct ctttgcata cctctcctc  
121 ggcccagctt tcctttgtg ctgaccacat catccctcac ttctctgtg accttggtgc  
181 cctgctcaag ttgctctgct cagatacctc cctcaatcag ttggcaatct ttacagcagg  
241 attgacagcc attatgcttc cattctgtg catcctggtt tctatggtc acattggggt  
301 caccatcctc cagattcct ctaccaaggg catatgcaaa gccttgcca ttgtgggat  
35 361 ccacctctca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
481 catgttg (SEQ ID NO:200).

**OR124**

40 LOCUS AF179745 484 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA128) gene, partial cds.  
ACCESSION AF179745  
KEYWORDS .

45 SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

50 REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)

0974155122100

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
5 FEATURES Location/Qualifiers  
source 1..484  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
10 gene <1..>484  
/gene="HLA128"  
CDS <1..>484  
/gene="HLA128"  
/codon\_start=2  
/product="olfactory receptor"  
15 /translation="VAICHPLHYTVIMREELCVFLVAVSWILSCASSLSHTLLLTRL  
FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPMCILVSYGYIGATI  
LRVPSTKGHKASTCGSHLSVVSLLYYGSIFGQYLFPTASSIDKDVIVAVMYTVITPM  
L" (SEQ ID NO:201).

20 BASE COUNT 87 a 143 c 105 g 149 t  
ORIGIN  
1 ttgtgccata tgtcacccctc tccactacac tgtcatcatg aggggaagagc tctgtgtctt  
61 cttagtggct gtagcttga ttctgtcttg tgccagctcc ctctctcaca ccttctcct  
121 gaccggctg ttttctgtg ctgcgaacac catcccccac gtcttctgtg acctgtctgc  
25 181 cctgtcaag ctgtcctgtc cagatatctt cctcaatgag ctggtcatgt tcacagtagg  
241 ggtgggtgct attacctgc cattcatgtg tatcctggta tcatatggct acattggggc  
301 caccatcctg aggggtccctt caaccaaagg gatccacaaa gcgtccacgt gtggctccca  
361 ttttctgtg gtgtctctct attatgggtc aatatttggc cagtaccttt tcccgaccgc  
421 aagcagtcc attgacaagg atgtcattgt ggctgtcatg tacacagtga tcacacccat  
30 481 gttg (SEQ ID NO:202).

OR125

LOCUS AF179746 484 bp DNA PRI 31-DEC-2000  
35 DEFINITION Hylobates lar olfactory receptor (HLA129) gene, partial cds.  
ACCESSION AF179746  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
40 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
45 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
50 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..484  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"

gene <1..>484  
 /gene="HLA129"  
 CDS <1..>484  
 /gene="HLA129"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYATIMSQSCVMLVAGSWVIACACALLHTLLLAQLS  
 FCADHIIPHFFCDLGALLKLSCSDTFLNELVMFTVGVVVITLPMCILVSYGYIGATI  
 LRPVSTKGIHKASTCGSHLSVVSLLYGSIFGQYLFPTASSIDKDVIVAVMYTVITPM  
 L" (SEQ ID NO:203).

BASE COUNT 85 a 139 c 111 g 149 t

ORIGIN

1 tgtggccatc tgtcaccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
 61 gctggtggct gggctcctggg tcacgcttg tgcgtgtgct ctttgcata cctcctcct  
 121 ggcccagctt tcctttgtg ctgaccacat catccctcac ttctctgtg accttggtgc  
 181 cctgctcaag ttgctctgct cagatacctt cctcaatgag ctggtcatgt tcacagtagg  
 241 ggtggtgggc attaccctgc cattcatgtg tatcctgcta tcatatggct acattggggc  
 301 caccatcctg aggggtccct caaccaaagg gatccacaaa gcgtccacgt gtggctccca  
 361 tcttctgtg gtgtctctct attatgggtc aatatttggc cagtaccctt tcccgaccgc  
 421 aagcagttcc attgacaagg atgtcattgt ggctgtcatg tacacagtga tcacacccat  
 481 gttg (SEQ ID NO:204).

OR126

LOCUS AF179747 486 bp DNA PRI 31-DEC-2000

DEFINITION Hylobates lar HLA130 pseudogene, partial sequence.

ACCESSION AF179747

KEYWORDS

SOURCE common gibbon.

ORGANISM Hylobates lar

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Hylobates lar"

/db\_xref="taxon:9580"

gene <1..>486

/gene="HLA130"

/pseudo

BASE COUNT 95 a 142 c 94 g 155 t

ORIGIN

1 tgtggccatc tgtcaccctc tacattatgc accatcatga gtcagagcca gtgtgtcatg  
 61 ctggtggctg ggtcctgggt catcgcttgt gcgtgtgctc ttttgcatac cctcctcctg  
 121 gccacgttt ccttttgtgc tgaccacatc atccctcact tcttctgtga ccttgggtgcc

181 ctgctcaagt tgtctgctc agatacctcc ctcaatcagt tggcaatctt tacagcagga  
 241 ttgacagcca ttatgcttcc attctgtgc atcctggtt cttatggtca cattggggc  
 301 accatctccc agattccctc taccaagggc atatgcaaag cctgtccat ttgtggatcc  
 361 cacctctcag tggtgactat ctattatggg acaattattg gtctctattt tcttcccca  
 421 tccagcaaca ccaatgacaa gaacataatt gcttcagtga tatacacagt agtcactccc  
 481 atgttg (SEQ ID NO:205).

## OR127

10 LOCUS AF179748 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA131) gene, partial cds.  
 ACCESSION AF179748  
 KEYWORDS  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>487  
 /gene="HLA131"  
 35 CDS <1..>487  
 /gene="HLA131"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICRPLYYPVIMKPHLCGLLVLSWFLSLSYSLSLIQSLLMLRVS  
 FCTSWVIQHFYCELAQVLTLCSDTHINYILLYMVTGLLGFVPFSGILFSYTQIVSSI  
 40 LRISSPDGKHKAFSTCGSHLSVVSFLFYGTGLGVYLSSNASSSSWRGMVASVMYTVVTP  
 NV" (SEQ ID NO:206).  
 BASE COUNT 80 a 145 c 106 g 156 t  
 ORIGIN  
 45 1 tgtggccatc tgtcgcccc tgtactacc tgatcatcg aaacctcacc tctgtggcct  
 61 gctggttctt gtgtcctggt tctcagctt gtcatactcc ctgatccaga gtctgtgat  
 121 gctgcgggtg tcctctcgca ccagttgggt cattcagcac ttctactgtg agcttgctca  
 181 ggtcctcacg ctgctctgct cagacacaca catcaattac atcctgctct acatgggtgac  
 241 cggccttttg ggctttgtgc ccttctcagg gatccttttc tctacaccc aaatcgtctc  
 50 301 ctccatcctg agaatctcat ccccatgatgg gaaacacaaa gccttttcta cctgtggatc  
 361 tcattgtctt gtggtttctt tattctatgg gacaggtctt ggctgtatc ttagttccaa  
 421 tgcacgtccc tcttctggc ggggcacgtt ggcttcgcta atgtacactg tggttaacccc  
 481 caatgtg (SEQ ID NO:207).

## OR128

LOCUS AF179749 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA132) gene, partial cds.  
ACCESSION AF179749  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>487  
/gene="HLA132"  
CDS <1..>487  
/gene="HLA132"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLLAQLS  
FCADHIIPHFCDLGLALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQTPSTKGICKALSICGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:208).  
BASE COUNT 95 a 144 c 94 g 154 t  
ORIGIN  
1 tgtggccatc tgtcaccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctggtggct gggctctggg tcatgcttg tgcgtgtgct ctttgcata ccctcctcct  
121 ggcccagctt tccttttgct ctgaccacat catccctcac ttctctgtg accttggtgc  
181 cctgtcgaag ttgtcctgct cagatacctc cctcaatcag ttggcaatct ttacagcagg  
241 attgacagcc attatgcttc cattctgtg catcctggtt tcttatggtc acattgggggt  
301 caccatcctc cagactccct ctaccaaggg catatgcaaa gccttgcca ttgtggatc  
361 ccaccttca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
481 catgttg (SEQ ID NO:209).

## OR129

LOCUS AF179750 487 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO100) gene, partial cds.  
ACCESSION AF179750  
KEYWORDS .  
SOURCE gorilla.  
ORGANISM Gorilla gorilla

09747155.122100

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
15 /organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>487  
/gene="GGO100"  
CDS <1..>487  
20 /gene="GGO100"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYTFIMDQNTCIQLAVISWSSSFLCSMVINVLTLSLP  
YCGPNILNHFFCEVPTVLRSLCTDTSFTELVVFIIFSIIIVFIPFLIVVSYVRILQSV  
25 LRMRASGRYKALSTCTSHLTVVTLFYGTAILMYMRPQSRSSWAGGKIIAVFYTVVTP  
ML" (SEQ ID NO:210).  
BASE COUNT 91 a 130 c 97 g 169 t  
ORIGIN  
1 tgtagccatt tgtcatcctc ttcattatac cttcattatg gacaaaaca cctgcattca  
30 61 actggcagtt atttcttggt ccagtagctt cctgtgttcc atggtatca atgttctcac  
121 gttgagttg ccctactgtg ggcctaatat cctgaatcac ttttctgtg aggtacctac  
181 tgtcctgagg ttgtcttgca ccgacacctc attcacggag ctggtgttt ttatcttcag  
241 tatcatcatt gtcttcaccc ctttctcct cattgttgtt tcctatgtcc ggatcctca  
301 atctgttctc aggatgcggt cagcctcgg gcggtataag gcattatcca cctgtacctc  
35 361 ccatttgaca gtggtaacct tatttatgg gactgccatc ctcattgaca tgagaccaca  
421 gtcgaggctc tctgggctg gcggcaagat cattgcggtt ttctacacgg tggtcacacc  
481 catgctt (SEQ ID NO:211).  
  
**OR130**  
40  
LOCUS AF179751 488 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla GGO101 pseudogene, partial sequence.  
ACCESSION AF179751  
KEYWORDS  
45 SOURCE gorilla.  
ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 488)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..488  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>488  
 /gene="GGO101"  
 /pseudo

BASE COUNT 91 a 144 c 113 g 140 t

ORIGIN

1 tgtggccatt agccaccac ttactatcc catcctcatg aatcagaggg tctgtctcca  
 61 gattaccggg agctcctggg cctttgggat aatcgatggc ttgatccag atggtggtag  
 121 taatgaattt ccctactgt ggcttgagga aggtgaacca ttcttctgt gagatgctat  
 181 ccttggtgaa gctggcctgt gtagacacat cctgtttga gaagggtgata ttgcttgct  
 241 gtgtcttcat gcttcttcc catttctcca tcatcgtggc ctctatgct cgcattctag  
 301 ggactgtgct gcaaatgcac tctgtcagg cctggaaaaa ggccctggcc acctgctcct  
 361 cccacctgac agctgtcacc ctcttctatg gggcagccat gttcatctac ctgaggccta  
 421 ggcgctaccg ggccccagc catgacaagg tggcctctat ctctacaca gtccttactc  
 481 ccattgctg (SEQ ID NO:212).

OR131

LOCUS AF179752 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO102) gene, partial cds.  
 ACCESSION AF179752  
 KEYWORDS

SOURCE gorilla.

ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>487  
 /gene="GGO102"  
 CDS <1..>487  
 /gene="GGO102"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VVICHPLHYTVIMREEFCVFLVAVSWILSCASSLSHTVLLTQLS

FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
LGV PSTKGIHKALSTCGSHLSVVSLEYGSIFGQYLFPTVSSFIDKDVIVALMYTVVTP  
TL" (SEQ ID NO:213).

BASE COUNT 87 a 137 c 106 g 157 t

ORIGIN

1 tgtgtcata tgcaccctc tccactacac tgtcatcatg aggggaagagt tctgtgtctt  
61 cttagtggct gtatcttggg ttctgtcttg tgccagctcc ctcttcaca ccgttctcct  
121 gaccagctg tcttctgtg ctgcgaacac catcccccatt gttctctgtg acctgtctgc  
181 cctgtctcaag ctgtcctgct cagatatctt cctcaatgag ctggctcatgt tcacagtagg  
241 ggtggtggc attaccctgc cattcatgtg tatcctggga tcatatggtt acattggggc  
301 caccatcctg ggggtccctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
361 ccattctctt gtggtgtctc tctattatgg gtcaatatt ggccagtacc ttcccgac  
421 tgaagcagt ttattgaca aggatgtcat tgtggctctc atgtacacgg tggtcacac  
481 cacgttg (SEQ ID NO:214).

### OR132

LOCUS AF179753 488 bp DNA PRI 31-DEC-2000

DEFINITION Gorilla gorilla GGO103 pseudogene, partial sequence.

ACCESSION AF179753

KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..488

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>488

/gene="GGO103"

/pseudo

BASE COUNT 86 a 149 c 108 g 145 t

ORIGIN

1 tgcggctgtc tgccaccac tccgatatcc cactctcatg agctggcagc tgtgcctgag  
61 gataaccatg ttgtcttggc tctgggtgc agctgacggg ctcatgcagg ctgttgctac  
121 cctgagcttc ccatattgcg gtgcacacga gatcgatcac ttcttctcg aggccccctg  
181 gctggttcat ttgcttggc ctgacacttc agtcttcgaa aacgcatgt acatctgctg  
241 tgtgttaatg ctctgtgtcc cctttccct catcctgtcc tctatggc tcacctcgc  
301 tctgttctg cacatgcgct ctacagaagc ccgcaagaag gccttgcca cctgtcttc  
361 acatttggt gtggtgggac tctttatgg agctgccatt ttacacctata tgagaccaa  
421 atccacagg tccactaacc acgataaggt tgtgtcagcc ttctatagta tgttcccc  
481 ttactaa (SEQ ID NO:215).



### OR133

LOCUS AF179754 458 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla GGO104 pseudogene, partial sequence.  
ACCESSION AF179754  
KEYWORDS  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 458)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 458)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..458  
/organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>458  
/gene="GGO104"  
/pseudo  
BASE COUNT 89 a 139 c 88 g 142 t  
ORIGIN  
1 ccaccatcat gagtacacgc cagtgtgtca tgetgtggc tgggtcctgg gtcacgctt  
61 gtgcgtgtgc tcttttgcac accctcctcc tggcccggct ttcttctgt gctgaccaca  
121 teatcctca cttcttctgt gaccttgggt ccctgtctca gttgtctgc tcagacacct  
181 cctcacaat gtagcaatc ttacacgag gattgacag cattatgctt ccattctgt  
241 gcatcctggt ttcttatggt cacattgggg tcaccatcct ccagattccc tctaccaagg  
301 gcatatgcaa agccttgtcc actgtggat cccacctctc agtgggtgact atctattatg  
361 ggacaattat tgggtcttat ttcttcccc catctgcaa caccaatgac gagaacataa  
421 ttgcttcagt gatatacaca gtagtcactc ccatattg (SEQ ID NO:216).

### OR134

LOCUS AF179755 477 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO106) gene, partial cds.  
ACCESSION AF179755  
KEYWORDS  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 477)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 477)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..477

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

10 gene <1..>477

/gene="GGO106"

CDS <1..>477

/gene="GGO106"

/codon\_start=2

/product="olfactory receptor"

15 /translation="VAIRKPLHYLVIMRQWVCVLLVMSWVGFLHSVFQLSIYGLP

FCGPNVIDHFFCDMYPLLKLVCTDTHVIGLLVVTNGGLSCTIVFLLLLISYGVLHSL

KKLSQKGRQKALSTCSSHITVVVFFVPCIFMYARPARSPIDKSVSVFYTVITPML"

(SEQ ID NO:217).

BASE COUNT 100 a 108 c 100 g 169 t

20 ORIGIN

1 tgtggccatc cgtaagccct tgcattattt gggtatcatg agacaatggg tgtgtgtgt

61 gctgctggta atgtcctggg ttgaggatt tctgcactca gtattcaac ttagcattat

121 ttatgggctc ccattctgtg gcccgaatgt cattgatcac ttttctgtg acatgtatcc

181 cttattgaaa ctggtctgca ctgacacca tgttattggc ctcttagtgg tgaccaatgg

25 241 aggactgtct tgcactattg tgttctgct ctactcatc tctatgggtg tcactctgca

301 ctctctaaag aaacttagtc agaaaggag gcaaaaagcc ctctcaacct gcagttccca

361 catcactgtg gttgtcttct tcttgttcc ttgtatttt atgtatgcta gacctgctag

421 gagttccccc attgacaaat cagtgagtgt gttttatata gtcataaccc caatgct (SEQ ID NO:218).

### 30 OR135

LOCUS AF179756 488 bp DNA PRI 31-DEC-2000

DEFINITION Gorilla gorilla olfactory receptor (GGO107) gene, partial cds.

ACCESSION AF179756

35 KEYWORDS

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

40 REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..488

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>488

/gene="GGO107"  
 CDS <1..>488  
 /gene="GGO107"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LAICYPLHYGAMMSSLLSVQLALGSWVCGFMAIAVPTALISGLS  
 FCGPRAINHFFCDIAPWIALACTNTQAVELVAFVIAVVVILSSCLITLVSYVYIISTI  
 LRIPSASGRSKAFSTCSSHLTVVLIWYGSTIFLHVRTSIKDALDLIAVHVLNTVVT  
 VL" (SEQ ID NO:219).

BASE COUNT 84 a 155 c 108 g 141 t  
 ORIGIN

1 tcttgccatc tgctatcctt tacactacgg agccatgatg agtagcctgc tctcagtga  
 61 gttggccctg ggctcctggg ttgtggtt catggccatt gcagtgccca cagccctcat  
 121 cagtggcctg tcttctgtg gccccgtgc catcaaccac ttctctgtg acattgcacc  
 181 ctggattgcc ctggcctgca ccaacacaca ggtagtagag ctgtggcct ttgtattgc  
 241 tgttgggtt atctgagtt catgctcat caccctgtc tctatgtgt acatcatcag  
 301 caccatctc agtatccct ctgccagtgg cggagcaaa gccttctcca cgtgctctc  
 361 gcattctacc gtgggtgctca ttgttatgg gtccacaatt ttccttcacg tccgcacctc  
 421 tatcaagac gccttgatc tgatcaaacg tgtccacgtc ctgaacactg tggtgactcc  
 481 agttttaa (SEQ ID NO:220).

## OR136

LOCUS AF179757 480 bp DNA PRI 31-DEC-2000

DEFINITION Gorilla gorilla GGO108 pseudogene, partial sequence.

ACCESSION AF179757

KEYWORDS

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 480)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 480)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..480

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>480

/gene="GGO108"

/pseudo

BASE COUNT 95 a 125 c 101 g 159 t

ORIGIN

1 tgtggcgggtg tgtaaccctc ttctctacac agttgcaatg tcccagaggc ttgtctcct  
 61 gttgttggt acatcatact gtgggggac agtctgttcc ctgacaccta ctttctactg  
 121 gaattatct tcagaggaaa taatatcatt aataactttg tctgtgagca cgctgtcatt  
 181 gttgctgtgt cttgctctga cccctatttg agccaggaga tcacttagt ttctgccaac

241 attcaatgaa ataagcagcc tggatgatcat tctcacttcc tatgctttca ttttatcac  
 301 tgtcatgaag acgccttcca ctggggggcg caagaaagcg ttctccacgt gtgcctccca  
 361 ctgacggcc attaccattt tccatgggac tatecttttc ctctactgtg ttctaactc  
 421 aagttcgcg ctcattgtca aggtggcctc tgcctttgc acagtgtgca ttcccatgtg (SEQ ID NO:221).

## OR137

LOCUS AF179758 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO109) gene, partial cds.  
 ACCESSION AF179758  
 KEYWORDS

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Gorilla gorilla"

/db\_xref="taxon:9593"

gene <1..>487

/gene="GGO109"

CDS <1..>487

/gene="GGO109"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLHYATIMSHSQCVMVLVAGSWVIACACALLHTLLRLS

FCADHIIIPHFFCDLGLALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI

LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP

ML" (SEQ ID NO:222).

BASE COUNT 95 a 148 c 93 g 151 t

ORIGIN

1 tgtggccatc tgtcaccctc tacattatgc caccatcatg agtcacagcc agtgtgtcat  
 61 gctgtgtgct gggtcctggg tcatcgcttg tgcgtgtgct cttttgcata ccctcctcct  
 121 ggcccggtt tcttctgtg ctgaccacat catcctcac ttcttctgtg acctgtgtgc  
 181 cctgtcaag ttgtcctgct cagacacctc cctcaatcag ttagcaatct ttacagcagg  
 241 attgacagcc attatgcttc cattcctgtg catcctggtt tcttatggtc acattggggt  
 301 caccatcctc cagattcctt ctaccaaggg catatgcaa gcctgtgcca ctgtgtggtc  
 361 ccacctctca gtggtgacta tctattatg gacaattatt ggtctctatt ttctccccc  
 421 atccagcaac accaatgaca agaacataat tgcttcagt atatacacag tagtcactcc  
 481 catgttg (SEQ ID NO:223).

# OR138

LOCUS AF179759 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA1) gene, partial cds.

ACCESSION AF179759

KEYWORDS .

SOURCE human.

ORGANISM Homo sapiens

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Homo sapiens"

/db\_xref="taxon:9606"

gene <1..>487

/gene="HSA1"

CDS <1..>487

/gene="HSA1"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICNPLLYPVMMNSNKLQAQLLSISYVIGFLHPLVHVSLLLRLT

FCRFNNHYFYCEILQLFKISCNGPSINALIIFIGAFIQIPTLMTHIISYTRVLFDI

LKKKSEKGRSKAFSTCGAHLVSVSLYYGTILFMYVRPASGLAEDQDKVYSLFYTHIIP

LL" (SEQ ID NO:224).

BASE COUNT 131 a 105 c 77 g 174 t

ORIGIN

1 ttagccata tgaatccct tgccttatcc agtgatgatg tccaacaaac tcagcgctca

61 gttgctaagt atttcatatg taattgggtt cctgcatcct ctggttcattg tgagtttact

121 attgcgacta actttctgca ggttaacat aatacattat ttctactgtg aaattttaca

181 actgttcaaa atttcattgca atgggtccatc tattaacgca ctaataatat ttatttttgg

241 tgcttttata caaataccca cttaaatgac taccataatc tcttatactc gtgtgctctt

301 tgatattctg aaaaaaaagt ctgaaaaggc cagaagcaaa gccttctcca catgcggcgc

361 ccattctgctt tctgtctcat tgtaactcgg aactctgac ttcatgtatg tgcgtcctgc

421 atctggctta gctgaagacc aagacaaagt gtattctctg ttttacacga ttataattcc

481 cctgcta (SEQ ID NO:225).

# OR139

LOCUS AF179760 487 bp DNA PRI 31-DEC-2000

DEFINITION Homo sapiens olfactory receptor (HSA10) gene, partial cds.

ACCESSION AF179760

KEYWORDS .

SOURCE human.

ORGANISM Homo sapiens

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..487  
15 /organism="Homo sapiens"  
/db\_xref="taxon:9606"  
gene <1..>487  
/gene="HSA10"  
CDS <1..>487  
20 /gene="HSA10"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYTVIMREELCVFLVAVSRILSCASSLSHTLLLTRL  
FCAANTVPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYIGATI  
25 LRVPSTKGIIHKALSTCGSHLSVVSLLYGSIFGQYLFPTVSSSIDKDVIVALMYTVDT  
ML" (SEQ ID NO:226).

BASE COUNT 87 a 142 c 106 g 152 t

ORIGIN  
1 tgttgccata tgtcaccctc tccactacac tgtcatcatg aggggaagagc tctgtgtctt  
30 61 cttagtggct gtagctcgga ttctgtcttg tgccagctcc ctctctcaca cctttctct  
121 gaccggctg tttttctgtg ctgcgaacac cgcccccat gtcttctgtg acctgtctgc  
181 cctgtcgaag ctgtctgtct cagatatctt cctcaatgag ctggctcatgt tcacagtagg  
241 ggtggtgggc attaccctgc cattcatgtg tatcctggta tcatatggct acattggggc  
301 caccatctg aggggtccct caaccaaagg gatccacaaa gcattgtcca catgtgggctc  
35 361 ccatctctct gtggtgtctc tctattatgg gtcaatatt ggccagtacc tttcccgcac  
421 tgtaagcagt tctattgaca aggatgtcat tgtggctctc atgtacacgg tggacacacc  
481 catgttg (SEQ ID NO:227).

# OR140

LOCUS AF179761 487 bp DNA PRI 31-DEC-2000  
DEFINITION Homo sapiens olfactory receptor (HSA12) gene, partial cds.  
ACCESSION AF179761  
KEYWORDS  
45 SOURCE human.  
ORGANISM Homo sapiens  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..487

/organism="Homo sapiens"

/db\_xref="taxon:9606"

10 gene <1..>487

/gene="HSA12"

CDS <1..>487

/gene="HSA12"

/codon\_start=2

/product="olfactory receptor"

15 /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC

FCADNVIPHFFCDMSALLKLAFSDFRVNEWVIFIMGGLILVIPFLLILGSYARIVSSI

LKVPSSKGICKALSTCGSHLSVVSIFYGTVIGLYLCSSANSSTLKDTVMAMMYTVVTP

ML" (SEQ ID NO:228).

BASE COUNT 85 a 141 c 103 g 158 t

20 ORIGIN

1 tgtggccatc tgcctcccc tgcactacac cgccatcatg agcccatgc tctgtctgc

61 cctgggtggc ctgtcctggg tctgaccac ctccatgcc atgttacaca ctttactcat

121 ggccagggtg tgttttttg cagacaatgt gatccccac ttttctgtg atatgtctgc

181 tctgtcgaag ctggcctct ctgacactcg agttaatgaa tgggtgatat ttatcatggg

25 241 agggctcatt ctgtcatcc cattctact catccttggg tcctatgcaa gaattgtctc

301 ctccatcctc aaggctcctt ctctaaggg tatctgcaag gccctctcta ctgtggctc

361 ccacctgtct gtggtgtcac tgtctatgg aaccgttatt ggtctctact tatgtcatc

421 agctaatagt tctactctaa aggacactgt catggctatg atgtacactg tggtagcccc

481 catgctg (SEQ ID NO:229).

## OR141

LOCUS AF179762 486 bp DNA PRI 31-DEC-2000

DEFINITION Homo sapiens HSA13 pseudogene, partial sequence.

35 ACCESSION AF179762

KEYWORDS .

SOURCE human.

ORGANISM Homo sapiens

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

40 Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..486

/organism="Homo sapiens"

/db\_xref="taxon:9606"

gene <1..>486  
/gene="HSA13"  
/pseudo

BASE COUNT 108 a 139 c 96 g 143 t

5 ORIGIN

1 cgtggctgtg tgtaaccccc tctctatgc catagtcag acaccaatga cccgcctggc  
61 gctgctggcc ggggcatatt ctgggtgcat agtcaattct gtgatctgca ctggctgcac  
121 ctctctatc tctcttcta agtccaacca ttagacttc ttttctgtg acctcccacc  
181 cctgctgaag ctgacctgta gtgaaaccag gccacgggaa tgggtgatct acctctcagc  
241 tttctggtc atcacaacca gcatttcagt gattcttaca tcgtactgt tcatcattca  
301 gtctattctg aagattcgta cagcagggtg aaagccaaga cttctccac ctgtgcttct  
361 cacaagactg cattgactct ctcttttga acactcatat tcataacct gaaaggcaac  
421 atggcgcaat cccttgagga agacaagatc gtgtcaatat ttactactgt ggtcatcccc  
481 atgcta (SEQ ID NO:230).

15

## OR142

LOCUS AF179763 487 bp DNA PRI 31-DEC-2000

DEFINITION Homo sapiens HSA16 pseudogene, partial sequence.

20

ACCESSION AF179763

KEYWORDS .

SOURCE human.

ORGANISM Homo sapiens

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

25

Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

30

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

35

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Homo sapiens"

/db\_xref="taxon:9606"

40

gene <1..>487

/gene="HSA16"

/pseudo

BASE COUNT 111 a 110 c 96 g 170 t

ORIGIN

45

1 catggccatt gtgaaccctt tactttatag agtagctatg actaaaatag tttgtattgt  
61 gctcgcatth ggggtcatgta tgggaggttt aatcagctca ttgacacata caattggcct  
121 ggtgaaactg tctttctgtg ggccaaatgt catcagtcac tcttctgtg atcttcccc  
181 actgttgaag ctgtcatggt ctgagacatc tatgaatgaa ttgtgcttt tgatctctc  
241 tggcattatt gccacgctca ctttttgac tgtggtgatc tctacatct tcattgttgc  
301 tgctatcctg aggatccgct aagaagcagg tagacgtaaa gccttctcca cctgcacctc  
361 tcacctgatt accgtgacct tattctatgg atcgataagc ttagttaca ttcagccaaa  
421 ctcccagtat tcctagaac aagaaaagggt ggtgtctgta tttataccc tgggtgttcc  
481 tatgtta (SEQ ID NO:231).

50



### OR143

LOCUS AF179764 485 bp DNA PRI 31-DEC-2000

DEFINITION Homo sapiens HSA18 pseudogene, partial sequence.

ACCESSION AF179764

KEYWORDS .

SOURCE human.

ORGANISM Homo sapiens

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..485

/organism="Homo sapiens"

/db\_xref="taxon:9606"

gene <1..>485

/gene="HSA18"

/pseudo

BASE COUNT 90 a 116 c 106 g 173 t

ORIGIN

1 cgtgggcac tgtaaccac tgtgtacac ggtcaccatg tctccccaga agtgtttgct  
61 ccttttactg ggtgtctatg ggatggggat ttggggctg tggtcatat gggaaacata  
121 atgtttatgt cctttgtgg agacaacct gtcaatcact atatgtgtga catccttct  
181 ctcttgagc tctctgcaa cagctcttac ataaattgc tggtggttt tattattgtg  
241 accgttgcca tgggggtgcc gattgtcacc attttctct ctatgggtt tattctttcc  
301 agcattctcc acattagtc cacagagggc aggtctaaag cttcagtac ctgcagtcc  
361 cacataattg tggatcgct tctttgggt cagggtgctt catgtacctc aaaccacctt  
421 ctatttacc cctggaccag gggaaagtgt cctccatttt ttgtactgct gtgggtccca  
481 tgttt (SEQ ID NO:232).

### OR144

LOCUS AF179765 486 bp DNA PRI 31-DEC-2000

DEFINITION Homo sapiens HSA2 pseudogene, partial sequence.

ACCESSION AF179765

KEYWORDS .

SOURCE human.

ORGANISM Homo sapiens

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..486  
/organism="Homo sapiens"  
/db\_xref="taxon:9606"  
gene <1..>486  
/gene="HSA2"  
/pseudo  
BASE COUNT 88 a 117 c 107 g 174 t  
ORIGIN  
1 cgtgggcac tgtaaccac tgtgtacac ggtcaccatg tctcccaga tgtgttgct  
61 cctttactg ggtgtctatg ggggtgggat tttggggctg tggtcatat gggaaacata  
121 atgtttatgt cctttgtgg agacaacct gtcaatcact atatgtgtga catccttct  
181 ctcttgagc cctctgcaa cagctcttac ataaattgc tggtggttt tattattgtg  
241 accgttgga tgggggtgcc gattgtcacc attttctct ctatggttt tattctttcc  
301 agcattctcc acattagttc cacagagggc aggtctaaag cttcagtac ctgcagttcc  
361 cacataattg tggatcgct tttcttggg tcagggtctt tcatgtacct caaaccacct  
421 tctattctac ccctggacca ggggaaagtg tctccattt ttgtactgc tgtggtgccc  
481 atgttt (SEQ ID NO:233).  
**OR145**  
LOCUS AF179766 487 bp DNA PRI 31-DEC-2000  
DEFINITION Homo sapiens olfactory receptor (HSA3) gene, partial cds.  
ACCESSION AF179766  
KEYWORDS  
SOURCE human.  
ORGANISM Homo sapiens  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Homo.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Homo sapiens"  
/db\_xref="taxon:9606"  
gene <1..>487  
/gene="HSA3"  
CDS <1..>487  
/gene="HSA3"  
/codon\_start=2  
/product="olfactory receptor"

/translation="VAICKPLHYVVMNNRVCTLLVLCCWVAGLMIIVPPLSLGLQLE  
 FCDSNAIDHFSCDAGPLLKISCSDTWVIEQMVILMAVFALHITPVCVILSYLYIVRTI  
 LKFPSVQQRKKAFTSCSSHMIVVSIAYGSCIFIYIKPSAKDEVAINKGVSVLTTSVAP  
 LL" (SEQ ID NO:234).

5 BASE COUNT 114 a 113 c 97 g 163 t  
 ORIGIN

1 tgtggccatc tgtaaacccc ttcattatgt ggatcatcatg aacaacaggg tgtgtacctt  
 61 attagttctc tgctgttggg tggctggctt gatgatcatt gtccaccac ttagcttagg  
 121 cctccagctc gaattctgtg actccaatgc cattgatcat ttagctgtg atgcagggtcc  
 10 181 tctcctaaag atctcatgct cagatacatg ggtaatagaa cagatggta tacttatggc  
 241 tgtatttgca ctattatca ccccagtttg tgtgattctg tctacttgt acatagtcatg  
 301 aacaattctg aagttccctt ctgttcagca aaggaaaaag gccttttcta cctgttcac  
 361 ccacatgatt gtggtttcca tgcctatgg aagctgcac tcatctata tcaagccctc  
 421 tgcaaaagat gaggtggcca taaataaagg agtttcagtt ctactactt ctgtcgacc  
 15 481 ctgttg (SEQ ID NO:235).

## OR146

20 LOCUS AF179767 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA5) gene, partial cds.  
 ACCESSION AF179767  
 KEYWORDS .

SOURCE human.

25 ORGANISM Homo sapiens  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

35 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

40 source 1..487  
 /organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 gene <1..>487  
 /gene="HSA5"  
 CDS <1..>487  
 /gene="HSA5"  
 45 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYTVIMREELCVFLVAVTWILSCASSLSHTLLLTRL  
 FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPMFCILVSYGYIGATI  
 LRV PSTKGIHKALSTCGSHLSVVS LYYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP  
 50 ML" (SEQ ID NO:236).

BASE COUNT 88 a 141 c 105 g 153 t

ORIGIN

1 tgttgccata tgtcacctc tccactacac tgcacatcatg aggggaagagc tctgtgtctt  
 61 cttagtggct gtaacttgga ttctgtcttg tgccagctcc ctcttcaca ccttctcct

00123456789

121 gaccggctg tcttctgtg ctggaacac catccccat gtctctgtg acctgtctgc  
 181 cctgtcaag ctgtcctgt cagatatct cctcaatgag ctggcatgt tcacagtagg  
 241 ggtgggtgctg attaccctgc cattcatgtg tctcctgga tcatatggct acattggggc  
 301 caccatcctg aggggtccct caaccaaagg gatccacaaa gcattgtcca catgtggctc  
 361 ccctctctct gtgggtgtct tctattatgg gtcaatatt ggccagtacc tttcccgac  
 421 tgtaagcagt tctattgaca aggatgtcat tgggtgtctc atgtacacgg tggcacacc  
 481 catgttg (SEQ ID NO:237).

# OR147

LOCUS AF179768 478 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens HSA6 pseudogene, partial sequence.  
 ACCESSION AF179768  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..478  
 /organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 gene <1..>478  
 /gene="HSA6"  
 /pseudo  
 BASE COUNT 89 a 128 c 103 g 158 t  
 ORIGIN

1 tgttgccatc tgtaaccctt tgcgtacct tacagtcatg aacccccagc tatgcctttg  
 61 gttggttctt gctgctggt gtgggggttt tatccactct atcatgcagg tcatactagt  
 121 catcagctg cttttctgtg ggcccaatga actggacaac ttctactgtg atgtcttaca  
 181 aatcatcaag ctggcctgca tggacaccta tgggttagag gtgctggtga tagccaacag  
 241 tggctctctg tctctgtct gcttctggt ctactattc tctatgcta tcatcctgat  
 301 caccctgaga acacgtctt gccagggcca gaacaaggtc ctctctacct gtgcttctca  
 361 cctgacagtg gtcagcctga tcttcgtgcc atgcgtattc atctattga ggccttctg  
 421 cagctctct gtggataaga tattctcctt gttttacaca gtgattacac ctatgttg (SEQ ID NO:238).

# OR148

LOCUS AF179769 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens HSA7 pseudogene, partial sequence.  
 ACCESSION AF179769  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens



/db\_xref="taxon:9606"  
 gene <1..>487  
 /gene="HSA8"  
 CDS <1..>487  
 /gene="HSA8"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYTSIMNRKLCTLLVLCAWLSGFLTIFPPLMLLLQLD  
 YCASNVIDHFACDYFPLLQLSCSDTWLLEVIGFYFALVTLLFTLALVILSYMYIIRTI  
 LRIPSASQRKKAFFSTCSSHMIVISISYGSCIFMYANPSAKEKASLTKGAILNTSVAP  
 ML" (SEQ ID NO:240).

BASE COUNT 115 a 119 c 80 g 173 t  
 ORIGIN

1 tgtgccatc tgcaagcccc ttattacac atccatcatg aacaggaaac tctgcactct  
 61 actgtgctg tgtgcctggc taagtgggtt tctgaccatt ttcccacccc ttatgcttct  
 121 cctccagctg gattactgtg ctccaacgt cattgatcac ttgcatgtg actattttcc  
 181 cctcttaca ctacttgtt cagatacatg gctcctagaa gtaattgggt ttacttttgc  
 241 ttgtgttact tgcgtgttca ctttggcatt agtgatttta tctacatgt acattatcag  
 301 gaccattttg agaatcccg tgcgcagtca aagaaaaaag gctttctcca ctgtttcttc  
 361 tcacatgatt gtcatttcca ttcttatgg aagctgtata ttcattgatg ctaatccatc  
 421 tgcaaaagaa aaggcatcat tgacaaaagg aatagctatt ctcaatacat ctgttgcccc  
 481 catgctg (SEQ ID NO:241).

# **OR150**

LOCUS AF179771 485 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU145) gene, partial cds.  
 ACCESSION AF179771  
 KEYWORDS

SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..485  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>485  
 /gene="EFU145"  
 CDS <1..>485  
 /gene="EFU145"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICQLQYSTAMSHQLCALMLAMCWLLTNCPALMHTLLLTRVA

FCAQRAIPHFYCDPSALLKLACSDTRINELMIAMGLAFLTVPLTLIVFSYVRISWAV  
 LGISSPGGRCKAFSTCGSHLTVVLLFYGSLMGVYLLPPSSYSYTERESRAAILYMVIIIP  
 M" (SEQ ID NO:242).

BASE COUNT 78 a 155 c 114 g 138 t

ORIGIN

1 tgtggccatc tgccagccac tccaatacag cacagctatg agtcaccagc tctgtgcact  
 61 catgtctggc atgtgtctgc tgctaaccac ctgtctctgca ttgatgcaca cgctgttgc  
 121 gaccctgtg gctttctgtg cccagagggc catccccac ttctactgtg atccagtg  
 181 tctctgaag ctgcctgct cggatacccg cataaacgag ctgatgatca tcgcatggg  
 241 ctggccttc ctacgggtc cctcacgct gatcgtcttc tctacgtcc gcatcctg  
 301 ggctgtgctt ggcatctctg ctcttgagg gcatgcaaa gcctctcca cctgtggtc  
 361 tcatctcag gtggtctgc tctctatgg gtctctatg ggtgtgtatt tgcctctcc  
 421 gtcatttac tctacagaga gggaagcag ggctgccatt ctctacatgg tgatattcc  
 481 catgt (SEQ ID NO:243).

OR151

LOCUS AF179772 485 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur fulvus EFU146 pseudogene, partial sequence.

ACCESSION AF179772

KEYWORDS

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..485

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>485

/gene="EFU146"

/pseudo

BASE COUNT 98 a 145 c 110 g 132 t

ORIGIN

1 cgttgccatc tgcaagcccc tccactaccg ggtgctcatg agcagcaggg tctgcacaca  
 61 gctcatctc gctgtctggtc tggcagggtt ctcttcacac attgtgcctg tcatcctgac  
 121 cagtcagctt ccattctgtg acaccacacat caaccattc ttctgtgact atacacctct  
 181 aatggagggtg gtctgcagtg ggccaaagggt gctggagatg gtggatttta ccctggcctt  
 241 ggtggcaccg ctacgacctt tgggtgctgat caccctgtcc tacatccaga tcatcagcac  
 301 gattgtcagg atcccctctg tccaggagag gaaaaaggct ttctccacct gttcctcca  
 361 tgcacatctg gttaccatgt gctatggaaa gctgttttt tatgtatgtc aagccctccc  
 421 caggcaagg ggttgatcta aacaaaggag tgtctctaat caatacagtt attgcccccc  
 481 tcttg (SEQ ID NO:244).

## OR152

LOCUS AF179773 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur fulvus olfactory receptor (EFU147) gene, partial cds.

ACCESSION AF179773

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>487

/gene="EFU147"

CDS <1..>487

/gene="EFU147"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICLPLHYTMVMKPRCCLMLVAASWLC SHCLAFSLTLLMTQFS

FCASHSIQHFFCDVPPLLKLACSDTHIFQVTMLTEGVLSGVIPLTCVLVSYAHIMHTI

LRIPSAGGKHKVFSTCGSHLSVVTFLFYGTFLFLVYFQPSSSYSADTGMVACVVYTMVTP

MV" (SEQ ID NO:245).

BASE COUNT 86 a 161 c 93 g 147 t

ORIGIN

1 cgtggccatc tgccttctc tgcactacac catggtcatg aaaccccgat gctgcctgat

61 gctgggtgca gcatcctggc tctgtccca ctgcttggt tctctctca ccttctgat

121 gactcagttc tcattctgtg cctcccatc catccaacac ttttctgtg atgtaccccc

181 actctcaaa ctgctgtt cagacacca tatcttcag gtcacaatgt taactgaagg

241 agtctctca ggtgtgatcc ctctacctg tctctggtc tctatgccc acatcatgca

301 caccatcctc aggatccctt ctgctggggg caagcacaaa gtcttctca cctgtggctc

361 tcactgtca gtgtgcactc tctctatgg gaccctctt ctggtgtatt tccagccttc

421 atctcttac tcagcagata ctggaatgt ggcatgtga gtatacacga tggtcacccc

481 catggtg (SEQ ID NO:246).

## OR153

LOCUS AF179774 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur fulvus olfactory receptor (EFU148) gene, partial cds.

ACCESSION AF179774

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus



Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>487

/gene="EFU148"

CDS <1..>487

/gene="EFU148"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICKPLHYVAIMSNTVCRRLVFCCWVAGLFIIIPPLSLGLNLE

FCSDTIDHFICDASPLLNISCSNTWFMEQTVIICAVLTLIMTLMCVVLSYIYIIKTI

LGFSQAQKKKAFSTCSSHMIVVSITYGSYIFIYIKPSAKEEVAINKGVTVLTTSIAP

ML" (SEQ ID NO:247).

BASE COUNT 118 a 118 c 88 g 163 t

ORIGIN

1 tgtggccatc tgcaaacgc tgcattatgt ggccattatg agtaacacag tctgcagaag

61 actgtcttt tgtgttggg tagctggctt gtttattata atccctccac ttagcctggg

121 cctaaatctg gaattttgtg attctgatac cattgatcat ttatctgtg atgcattccc

181 cctcctgaat atctcttgtt caaatacttg gttcatggaa cagactgtta tcattctgtc

241 agtgcagacc ctattatga cacttatgtg ttagttctg tctacattt atactcatca

301 gacaatttta ggattctctt ctgcccagca aaagaaaaaa gcctttcca cctgttcttc

361 ccacatgatt gtggtgtcca tcacctatgg cagctacatc ttactctata tcaaaccttc

421 tgcaaggaa gaagtagcca ttaacaaggg tgtgacagtc ctactactt ccactgcccc

481 catgctg (SEQ ID NO:248).

## OR154

LOCUS AF179775 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur fulvus olfactory receptor (EFU149) gene, partial cds.

ACCESSION AF179775

KEYWORDS

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..487

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

10 gene <1..>487

/gene="EFU149"

CDS <1..>487

/gene="EFU149"

/codon\_start=2

/product="olfactory receptor"

15 /translation="VAICKPLHYRVIMNRRVCTLLVFASWLVSFLIVFPALMLLLKLD

YCGFNIIDHFTCDYFPLLQLSCSDTKFLEIMGFSCAVFTLMFTLALIFLSYMHIVRTI

LRIPSTSQRKAFSTCSSHMIVISISYGSCIFMYIKPSAKDRVSLKAVAVLITSVAP

ML" (SEQ ID NO:249).

BASE COUNT 109 a 113 c 91 g 174 t

20 ORIGIN

1 tgttgctatc tgtaagcccc tgcattacag ggtcatcatg aatcgaagag tctgcacact

61 gctcgtcttt gcctcttggc tggtttcatt cttaatcgtat tccccagcac tcattgtgct

121 cttaaagctt gattactgtg gatttaatat tattgacctt ttacctgtg attattttcc

181 cctgctgcag ctttcctgtt cagatacaaa attcctggag ataatggggg ttcctgtgct

25 241 tgtgtttact ctaattgtca ctttggcatt aatatttctg tctacatgc acatcgtgag

301 aacgattttg agaattcctt ctactagtca gaggacaaag gccttttcta catgttcttc

361 ccacatgatt gtcatttcca tctcttatgg cagctgcatt ttatgtaca ttaagccctc

421 agcaaaggat agagtatctt tgagcaaggc agtggctgtg ctaatcacct cagtagctcc

481 catgctc (SEQ ID NO:250).

## OR155

LOCUS AF179776 484 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur fulvus EFU150 pseudogene, partial sequence.

35 ACCESSION AF179776

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

40 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 484)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..484

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>484  
/gene="EFU150"  
/pseudo

BASE COUNT 80 a 157 c 112 g 135 t

ORIGIN

1 tctggctatc tgctatcctc tacactacgg gacaatcatg agcagcctgc tggctgcaca  
61 gctggccttg ggctcctggg tctgtggtt cctggccatt gcagtgtga cggcccttat  
121 cagtggcctg tccttctgtg gcgcccgtgc catcaatcac ttcttctgtg acattgcacc  
181 ctggatcgcc ctggcctgta ccagcacaca ggcaatagag ctctggcct ttgtgattgc  
241 ttttgggtc atcctgagtt catgcctcat caccctggtc tctacgtgt acattatcag  
301 caccatcctc aggatcccat ctgccagcgg cggagcaaag ccttctctac gtgctcctct  
361 caccacaccg tgggtctcat ctggtatggg tccacgatt ttctcatgt cgcacctcc  
421 atcacagacg ccttgatct gaccaaagct gtccatgtcc tgaacaccgt ggtgactcca  
481 gttc (SEQ ID NO:251).

OR156

LOCUS AF179777 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur fulvus olfactory receptor (EFU151) gene, partial cds.

ACCESSION AF179777

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>487

/gene="EFU151"

CDS <1..>487

/gene="EFU151"

/codon\_start=2

/product="olfactory receptor"

/translation="LAICYPLHYRTIMSSLLATQLALGSWVCGFLAIAVLTALISGLS

FCGARAINHFFCDIAPWIALACTSTQAIELVAFVIAFVVILSSCLITLVSYVYIISTI

LRIPSASGRSKAFSTCSSHLTVVLIWYGSTIFLHVRTSITDALDLTKAVHVLNTVVTP

VL" (SEQ ID NO:252).

BASE COUNT 83 a 159 c 110 g 135 t

ORIGIN

1 tctggctatc tgctatcctc tacactacag gacaatcatg agcagcctgc tggctacaca  
61 gctggccttg ggctcctggg tctgtggtt cctggccatt gcagtgtga cggcccttat  
121 cagtggcctg tccttctgtg gcgcccgtgc catcaaccac ttcttctgtg acattgcacc

181 ctggattgcc ctggcctgca ccagcacaca ggcaatagag ctggtggcct ttgtgattgc  
 241 ttttgggtc atcctgagtt catgcctcat caccctggtc tctacgtgt acattatcag  
 301 caccatcctc aggatcccat ctgccagcgg cggagcaaa gccttctcta cgtgtcctc  
 361 tcacctcacc gtgggtctca tctggtatgg gtccacgatt ttcttcattg tccgcacctc  
 421 catcacagac gccttggatc tgaccaaagc tgtccatgct ctgaacaccg tggtgactcc  
 481 agttcta (SEQ ID NO:253).

## OR157

10 LOCUS AF179778 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU153) gene, partial cds.  
 ACCESSION AF179778  
 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 15 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 30 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>487  
 /gene="EFU153"  
 CDS <1..>487  
 35 /gene="EFU153"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYRVIMNRRVCTLLVFASWLVSFLIVFPALMLLLKLD  
 YCGFNIIDHFTCDYFPLLQLSCSDTKFLEIMGFSCAVFTLMFTLALIFLSYMHIVRTI  
 40 LRIPSTSQRTKAFSTCSSHMIVISISYGSCIFMYIKPSAKDRVSLSKAVAVLITSVAP  
 ML" (SEQ ID NO:254).  
 BASE COUNT 109 a 113 c 91 g 174 t  
 ORIGIN  
 1 tgttgctatc tgtaagcccc tgcattacag ggatcatcatg aatcgaagag tctgcacact  
 45 61 gctcgtcttt gcctcttggc tggtttcatt cttaatcgta ttccagcac tcatgttgct  
 121 cttaagctt gattactgtg gatttaatat tattgacat ttacctgtg attatttcc  
 181 cctgtgcag ctctcgtgt cagatacaaa attcctggag ataatggggt ttctctgtc  
 241 tgtgttact ctaatgttca cttggcatt aatatttctg tctacatgc acatcgtgag  
 301 gacgattttg agaattcctt ctactagtca gaggacaaag gccttttcta catgttctc  
 50 361 ccacatgatt gtcattcca tctcttatgg cagctgcatt tttatgtaca ttaagccctc  
 421 agcaaaagat agagtatctt tgagcaaggc agtggctgtg ctaatcacct catgactcc  
 481 catgctc (SEQ ID NO:255).

## OR158

LOCUS AF179779 488 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU154) gene, partial cds.  
5 ACCESSION AF179779  
KEYWORDS .  
SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 488)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 488)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
20 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..488  
/organism="Eulemur fulvus"  
/db\_xref="taxon:13515"  
25 gene <1..>488  
/gene="EFU154"  
CDS <1..>488  
/gene="EFU154"  
/codon\_start=2  
30 /product="olfactory receptor"  
/translation="MAICHPLRYPVFMNHRVCLFLASGCWFLGSVDGFMLTPITMTFP  
YCRSREIHHSFCEVPAVTTLSGSDTSLYEMLMYLCCVLMMLIPVTVISSYSFILLTI  
HRMGSAEGRKKAFATCSSHMTVVILFYGAAIYTYMLPSSYHTPEKDMMVSVFYTILTP  
VL" (SEQ ID NO:256).  
35 BASE COUNT 92 a 163 c 95 g 138 t  
ORIGIN  
1 catggccatc tgccatccgc tccgttaccg tgtctcatg aaccacaggg tgtgtctctt  
61 cctggcatct ggctgctggt tcttgggatc agtagatggc tcatgctca ctccaatcac  
121 catgacctc ccctactgca ggtcccggga gattcaccat tcttctgcg aagtcctgct  
40 181 tgtaacgacg ctttctgct cagacacctc actctatgaa atgctcatgt acctgtgctg  
241 tgtctcatg ctctctatc ctgtgacagt cattcaagc tctattcat tcattctct  
301 caccatccac aggatgggct cagcagaggg ccggaagaag gccttgcca cctgttctc  
361 ccacatgacc gtgggtatcc tcttctatgg ggccgccatc tacacctaca tgcctcccag  
421 ctctaccac actcctgaga aggacatgat ggtgtctgtc tttatacca tctaactcc  
45 481 tgtgctaa (SEQ ID NO:257).

## OR159

LOCUS AF179780 488 bp DNA PRI 31-DEC-2000  
50 DEFINITION Eulemur fulvus EFU155 pseudogene, partial sequence.  
ACCESSION AF179780  
KEYWORDS .  
SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus



Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..488

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"

gene <1..>488

/gene="EFU155"

/pseudo

BASE COUNT 111 a 113 c 91 g 173 t

ORIGIN

1 tgttgctatc tgtaagcccc tgcattacaa ggatcatcatg aatcgaagag tcgtgcacac

61 tgctcgtctt tgcctcttgg ctggtttcat tctaatcgt attccagca ctcattgtgc

121 tcttaaagct tgattactgt ggatttaata ttattgacca tttacctgt gattatttc

181 ccctgctgca gcttctctgt tcagatacaa aattcctgga gataatgggg tttcctgtg

241 ctgtgtttac tctaatgttc actttggcat taatatttct gtcctacatg cacatcgtga

301 gaacgatttt gagaattcct tctactagtc agaggacaaa ggccttttct acatgttctt

361 cccacatgat tgcatcctcc atctcttatg gcagctgcat tttatgtac attaagccct

421 cagcaaagga tagagtatct ttgagcaagg cagtggctgt gctaatcacc tcagtagctc

481 ccatgcac (SEQ ID NO:258).

**OR160**

LOCUS AF179781 486 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur fulvus EFU156 pseudogene, partial sequence.

ACCESSION AF179781

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Eulemur fulvus"

/db\_xref="taxon:13515"  
 gene <1..>486  
 /gene="EFU156"  
 /pseudo

5 BASE COUNT 119 a 110 c 93 g 164 t  
 ORIGIN

1 tgtggccatc tgcaagcccc tgcattatgt gaccgtcatg aacagcagag ttgcaggat  
 61 tctcatcatc tgtgttggg tggctggtt atgcataata atccctccac ttagcctggg  
 121 tttaaatcta aaattctgtg actctaacat gattgatcat ttggttgcg atgcatttcc  
 181 cctggtgaaa atctcatgct cagacacatg gttcatggaa cagacggta tcactgtgct  
 241 tgtgctgacc ctgaatatga ctctaacttg ttagttctg tcatacgctt acatcatcaa  
 301 gacaatttt agattccctt ctgtccagca aaggaaaaag gcctttcca cctgttcttc  
 361 ccacatgatt gtggtttcca tcacatgag cactgtcatt ttcattaca tgaatcctac  
 421 agcaaaggaa gaagtgaccg ttaataaagt agtttcttg ctatttctt ctatttgc  
 481 acattg (SEQ ID NO:259).

## OR161

20 LOCUS AF179782 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur rubriventer ERU157 pseudogene, partial sequence.  
 ACCESSION AF179782  
 KEYWORDS .

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

25 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

35 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

gene <1..>486

/gene="ERU157"

/pseudo

45 BASE COUNT 78 a 157 c 112 g 139 t

ORIGIN

1 cgtggccatc tgccagccac cccaatacag cacagctatg agtccccagc tctgtgcact  
 61 catgctggcc atgtgtctggc tgctaaccag ctgtcctgcg ttgatgcaca cgctgttgc  
 121 gaccctgttg gctttctgtg cccagaaggc catccccac ttctactgtg atcccatgct  
 181 tctctgaag ctgcctgct cggatacccg cataaatgag ctgatgatca tcgcatggg  
 241 cttgacgttc ctactatc cctcacact gatcgtcttc tctacgtcc gcatctctg  
 301 ggctgtgctt ggcatctcgt ctctggcgg gcgatgcaag gccttctcca cctgtggttc  
 361 tcactcagc gtggttctgc tctctatgg gtctctatg ggtgtgtatt tgcttctcc  
 421 gtcatcttac tctacagaga gggaaagcag gctgccattc tctacatggt gatcattccc  
 481 atgtta (SEQ ID NO:260).

## OR162

LOCUS AF179783 484 bp DNA PRI 31-DEC-2000  
5 DEFINITION Eulemur rubriventer ERU159 pseudogene, partial sequence.  
ACCESSION AF179783  
KEYWORDS .  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
15 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..484  
/organism="Eulemur rubriventer"  
25 /db\_xref="taxon:34829"  
gene <1..>484  
/gene="ERU159"  
/pseudo  
BASE COUNT 123 a 103 c 94 g 164 t  
30 ORIGIN  
1 tgtggccatc tgcaaccac tgaggatcc catcatcatg aacaggggtg tataagtgc  
61 aatggctgca tggctcttga tcataggcta tctgatctcc ttagtcaaa cagtcttgac  
121 aatgatattg ccttctgtg gcaataatgt cattgatcat attaccttg agatcctggc  
181 tcttaaacat atatgctcag atattccat gaatgtgctt atcatggcag tggcaagtat  
35 241 tgttatattg gtgattcctc tgctgttcat tttatctcc tatgtattca tcctctcttc  
301 catcctgaga attaatctt ctgaggggag aaagaaagcc ttgcaacct gtcagccca  
361 cctgactgtg gtcattctt tctatgggtc agctctttt atgtacatga agcctaagtc  
421 aaagtacaca aaagtatctg atgaaatcat tgcactgtct tacggagtag taacccaat  
481 gttg (SEQ ID NO:261).

## OR163

LOCUS AF179784 487 bp DNA PRI 31-DEC-2000  
45 DEFINITION Eulemur rubriventer olfactory receptor (ERU160) gene, partial cds.  
ACCESSION AF179784  
KEYWORDS .  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
50 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates



JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
5 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Eulemur rubriventer"  
10 /db\_xref="taxon:34829"  
gene <1..>487  
/gene="ERU160"  
CDS <1..>487  
15 /gene="ERU160"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPHYTTIMREELCTLLVAISWLLSCASSLSHTLLLTRL  
FCAANVIPNFFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFLCILVSYGYIGATI  
LRVPSTKGICKALSTCGSHLSVVSLEYGAIFGQYLFALSNSIDKDIIVAMMYTVVTP  
20 ML" (SEQ ID NO:262).  
BASE COUNT 91 a 143 c 104 g 149 t  
ORIGIN  
1 tgttgccata tgtcacccctc tccactacac caccatcatg aggggaagagc tctgcacctt  
61 attggtggct atactctggc tctgtcttg tgccagctcc ctctcccaca cccttctcct  
25 121 gaccgggctg tcttctgtg ctgctaattg cattccaac ttcttctgtg acctgtctgc  
181 tctgtcctag ctgtcctgct cagacatctt cctcaatgag ctggctcatgt ttacagtagg  
241 ggtggtgggc attacctgc cattcttatg tctcctggta tcttacggct acattggggc  
301 caccatcctg aggggtccctt caaccaaagg gatctgcaaa gcattatcca cgtgtgggtc  
361 ccattctctc gtggtgtctc tgtactacgg ggcaatattt gggcagtacc ttctccagc  
30 421 attagcaat tccattgaca aggacatcat tgtggctatg atgtacacgg tggtcacacc  
481 catgttg (SEQ ID NO:263).  
**OR164**  
35 LOCUS AF179785 475 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur rubriventer olfactory receptor (ERU161) gene, partial cds.  
ACCESSION AF179785  
KEYWORDS .  
SOURCE Eulemur rubriventer.  
40 ORGANISM Eulemur rubriventer  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemnidae; Eulemur.  
REFERENCE 1 (bases 1 to 475)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 475)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
50 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..475

/organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 gene <1..>475  
 /gene="ERU161"  
 CDS <1..>475  
 /gene="ERU161"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYMNIMSRQLCHLLVAGSWLGGFLHSIIQIFITIQSP  
 FCGPNVIDHYFCDLLPLFKLACTDTFVEGLTVLANSGLIPVCSLFILVSSYIHLVHL  
 RKHSAEGRHKALSTCASHITVVILFFGPAIFLYMRPSSSTFTEDKLMGVLYTVITPS" (SEQ ID

NO:264).

BASE COUNT 92 a 133 c 97 g 153 t

ORIGIN

1 cgtggcaatc tgcaagcctc ttcattacat gaatattatg agtcgtcaac tgtgtcacct  
 61 tctgggtgct gggtcctggc tgggaggcct tcttcactct attattcaga tttttatcac  
 121 catccaatcg cccctttgtg gtccaacgt gattgaccac tacttctgtg acctcctgcc  
 181 attattcaag ctgctctgca ccgacacct ttagaggggg ctgactgtgt tggccaatag  
 241 tggttaatt cccgtgtgct ccctgtttat cctgggtgcc tcttatatca ttattctggt  
 301 gcacttgagg aaacattctg cagaggggag gcacaaagcc ctctctacct gtgcctctca  
 361 catcacggtg gtcattttgt ttttggacc tgccatcttc ctctacatgc gaccttcttc  
 421 taccttcaca gaagacaaac tcatgggtgt gttgtacaca gtcacaccc ccagt (SEQ ID NO:265).

## OR165

LOCUS AF179786 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU162) gene, partial cds.

ACCESSION AF179786

KEYWORDS

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

gene <1..>487

/gene="ERU162"

CDS <1..>487

/gene="ERU162"

/codon\_start=2

/product="olfactory receptor"

/translation="VAISNPPLYVQAMPRKLCICFIICSYTGGFVNAILTSNTFTLD

FCGDNVIDDFCDVPPLVKLACDVEGSYQAVLYFLLASNVISPAMLILASYVFHAAV  
 LRVRSSRGLKAFSTCSSHLISVTLYYGSILYIYSRPSSSYSLERDKMVSTFYTVLFP  
 TL" (SEQ ID NO:266).

BASE COUNT 91 a 158 c 98 g 140 t

ORIGIN

1 tgtggccatc tccaaccccc cgctctatgt tcaggccatg ccaaggaaac tgtgcatctg  
 61 ttcattatc tggcataca ctggaggctt tgtaatgca ataattataa ccagcaacac  
 121 attcacgttg gattttgtg gtgacaatgt catcgacgac ttttctgtg atgtcccacc  
 181 cctgggtgaag ttggcctgtg atgtggaagg gagctaccag gctgtgctgt acttctcct  
 241 ggctcccaac gtcatctccc cgccatgct catctcgcc tctacgtct tcatcatgac  
 301 agcagtcttg aggggtccgt ccagccgggg ccgctcaag gccttctcca cgtgctctc  
 361 ccacctgac tctgtacct tatactacgg ctccattctc tacatctact ctgcccacg  
 421 tccagctat tcctcgaga gggacaaaat ggtctctacc tttacaccg tgctgttccc  
 481 cagctc (SEQ ID NO:267).

## OR166

LOCUS AF179787 478 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU163) gene, partial cds.

ACCESSION AF179787

KEYWORDS

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 478)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 478)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..478

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

gene <1..>478

/gene="ERU163"

CDS <1..>478

/gene="ERU163"

/codon\_start=2

/product="olfactory receptor"

/translation="VAVCNPLHYLTVMNRQLCLQLVFACWCGGFIHSVTQVILVIQLP

FCGPNKLDSFYCDVPEVIKLACLDITYVVEVLMVTNSGLLSLVCFLVLIFSATILTTL

RTLHQQGQSKAFSTCASHLMVSLIFVPCVFIYLRPFCSFSVDKIFSVFYMVITPML" (SEQ ID

NO:268).

BASE COUNT 85 a 132 c 108 g 153 t

ORIGIN

1 tgttgccgta tgtaaccctt tgcattacct gacggctcatg aaccgccagc tctgccttca  
 61 gttggtttt gcctgctggt gtggggggtt catccactct gtcacacagg ttatactggt  
 121 catccagctg cccttctgtg gccccaacaa attggacagt ttctactgtg atgtcccaga

181 ggtcatcaag ctggcctgcc tggacaccta tgtgtagaa gtgctgatgg ttaccaacag  
 241 tggctgtcta tctctgtct gcttcttggc ctgatattc tcttatgcca ccatcctgac  
 301 caccctgaga actcgcctcc accagggcca gagcaaggcc ttctctacct gtgcctccca  
 361 cctaattggtg gtcagcctga tctttgtgcc atgtgtattc atctactga ggcctttctg  
 5 421 cagcttctct gtggataaga tattctctgt gttttacatg gtgatcacac ctatgttg (SEQ ID NO:269).

## OR167

LOCUS AF179788 487 bp DNA PRI 31-DEC-2000  
 10 DEFINITION Eulemur rubriventer olfactory receptor (ERU164) gene, partial cds.  
 ACCESSION AF179788  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 20 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
 30 gene <1..>487  
 /gene="ERU164"  
 CDS <1..>487  
 /gene="ERU164"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYTTIISTRVCILLVCSSWLAGFLIIFPPIILLQLD  
 35 FCASNIIDHFICDSSPILQLSCTNTHFLELMAFCLAVVTLMVTLTLVILSYTNIIRTI  
 LRIPSMSQRKKAFSTCSSHIIIVVLSYGSCIFMYIKPSTRERVTL SKGVAVVNTSVAP  
 40 LL" (SEQ ID NO:270).  
 BASE COUNT 116 a 116 c 79 g 176 t  
 ORIGIN  
 1 tgtggccatc tgcaaacctc tcattacac aaccatcatt agcaccaggg ttgtatcct  
 61 tctgtctgt agtcctcggc ttgcaggatt ctgatcatc ttccaccaa taatccttct  
 45 121 tctgcagttg gacttctgtg cctccaatat aattgatcat ttatctgtg attcttctcc  
 181 aattctgcag ctttcttcta caaacactca ctttctagaa ctcatggcat ttgttttagc  
 241 cgtggtgaca ctcatggtca ccttgacctt agttattctc tctatacaa atattatcgg  
 301 gacaattcta agaattcctt ctatagatca aaggaaaaaa gcctttcca ctgttctctc  
 361 ccatataata gttgtttccc tctcttatgg tagttgtatc tcatgtaca taaagccttc  
 50 421 tacaagggaagggtgactt taagcaaaagg agtagctgtg gtaataactt cagtggctcc  
 481 tcttttg (SEQ ID NO:271).

## OR168

LOCUS AF179789 483 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur rubriventer ERU165 pseudogene, partial sequence.

ACCESSION AF179789

KEYWORDS .

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 483)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 483)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..483

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

gene <1..>483

/gene="ERU165"

/pseudo

BASE COUNT 98 a 144 c 108 g 133 t

ORIGIN

1 cgttgccatc tgcaagcccc tccactaccc ccgtgctcat gagcagcagg gtctgcacac  
61 agctcatcct cgctgctgg ctggcagggt tctcctcat cattgtgcct gtcacctga  
121 ccagtcatgt tccattctgt gacaccaca tcaaccactt cttctgtgac tatacacctc  
181 taatggagggt ggtctgcagt gggccaaagg tgctggagat ggtggatttt accctggcct  
241 tgggtggcact gtcagcacc ttgggtgctga tcacctgtc ctacatccag atcatcagga  
301 cgattgtcag gatccctct gtccaggaga ggaaaaaggc ttctccacc tgttcctccc  
361 atgtcatcgt gggtaccatg tgctatggaa gctgttttt tatgtatgtc aagccctccc  
421 caggcaagg ggttgatcta aacaaaggag tgtcttaatc aatacaatta tgcctcccct  
481 ctt (SEQ ID NO:272).

## OR169

LOCUS AF179790 486 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU167) gene, partial cds.

ACCESSION AF179790

KEYWORDS .

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

gene <1..>486

/gene="ERU167"

CDS <1..>486

/gene="ERU167"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLRYTDMTPRLCGLLVSLSLICSADALLHSLMLLQLS

FCTDLEISLFFCEVVQVVKLACSDTLVNNLLIYFAACTLGGIPLSGIIFSQTQIATSI

LKMPSSGRKYKAFSTCGSHLSVVSFLFYGTGLGVYISSAVSDSSRRRTAVASVMYTVVTP

C" (SEQ ID NO:273).

BASE COUNT 83 a 139 c 107 g 157 t

ORIGIN

1 tgtggccatc tgtcaccctc tgagatacac agacatcatg actcctcgtc tgttggtct

61 gctggtttca cttccctgt ccatttgcgc cgcggatgcc ctgctccaca gcctcatgct

121 gctgcagctg tcttctgca cagacctga aatcctcctt tcttctgtg aagtcgttca

181 ggctgcaag ctgcgtgct ccgataccct cgtcaacaac cttctgatct attttgcagc

241 ttgcaccttg ggtggcattc ctctgtctgg catcatttt tcttacactc aaatagccac

301 ctccattttg aaaatgccgt catcgggcag aaagtataaa gcctttcca cctgtgggtc

361 tcacctgtca gttgtttccc tttctatgg gacaggtttg ggggtgtaca tcagttctgc

421 agtttctgac tcttaagga ggactgcggt ggcttcagt atgtacactg tggtcactcc

481 ctgttg (SEQ ID NO:274).

## OR170

LOCUS AF179791 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU168) gene, partial cds.

ACCESSION AF179791

KEYWORDS

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"  
 gene <1..>487  
 /gene="ERU168"  
 CDS <1..>487  
 /gene="ERU168"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLTYTDIMTPRLCGLLVSLSLICSADALLHSLMLQLS  
 FCTDLEISLFFCEVVQVVKLACSDTLVNNLLIYFAACTLGGIPLSGIIFSQTQIATSI  
 LKMPSSGRKYKAFSACGSHLSVVSFLFYGTGLGVYISSAVSDSSRRTAVASVMYTVVTP  
 VL" (SEQ ID NO:275).

BASE COUNT 82 a 140 c 108 g 157 t

#### ORIGIN

1 tgtggccatc tgtcacccctc tgacatacac agacatcatg actcctcgtc tgtgtggtct  
 61 gctggtttca ctttcctgt ccatttgctc cgcggatgcc ctgtccaca gcctcatgct  
 121 gctgcagctg tcctctgca cagacctga aatctccctt ttctctgtg aagtcgttca  
 181 ggctgctaag ctgcggtgct ccgataccct cgtcaacaac cttctgatct atttgcagc  
 241 ttgcaccttg ggtggcattc ctctgtctgg catcatttt tcttacactc aaatagccac  
 301 ctccatttg aaaatgccgt catcgggcag aaagtataaa gccttttccg cctgtgggtc  
 361 tcacctgtca gttgtttccc tgttctatgg gacagggttg ggggtgtaca tcagttctgc  
 421 agtttctgac tctcaagga ggactcgggt ggcttcagtg atgtacactg tggtcactcc  
 481 cgtgttg (SEQ ID NO:276).

#### OR171

LOCUS AF179792 486 bp DNA PRI 31-DEC-2000  
 DEFINITION *Macaca sylvanus* olfactory receptor (MSY172) gene, partial cds.  
 ACCESSION AF179792  
 KEYWORDS  
 SOURCE Barbary ape.  
 ORGANISM *Macaca sylvanus*  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.

REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..486  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>486  
 /gene="MSY172"  
 CDS <1..>486  
 /gene="MSY172"  
 /codon\_start=1  
 /product="olfactory receptor"

/translation="PAICQPLRYRVLNMHRLCVLLVGAAWVLCLLKSVTETVIAMRLP  
FCGHHVVSHFTCEILAVLKLTCGNTSVSEVFLLVGSILLPVPLAFICLSYLLILATI  
LRVPSAAGCRKAFSTCSAHLAVLLFYSTIIFTYMKPKSKEAHISDEVFTVLYAMVTP  
ML" (SEQ ID NO:277).

5 BASE COUNT 79 a 163 c 125 g 119 t  
ORIGIN

1 cctgccatct gccagccact caggtaccgc gtgctcatga accaccggct ctgtgtgctg  
61 ctggtgggag ctgcctgggt cctctgcctc ctcaagtcgg tgactgagac agtcattgcc  
121 atgaggctgc cttctgtgg ccaccacgtg gtcagtcact tcacctgcga gatcctggcg  
10 181 gtgctgaagc tgacgtgcgg taacacatcg gtcagcgagg tcttcctgct ggtgggctcc  
241 atcctgctgc tgcctgtgcc cctggcattc attgcctgt cctacttgct catcctggcc  
301 accatctga ggggtgcctc agctgctggg tgccgcaaag ccttctccac ctgctcagca  
361 cacctggctg tgggtgctgt ttctacagc accatcatct tcacgtacat gaagcccaag  
421 agcaaggaag cccacatctc tgatgagtc ttcacagtcc tctacccat ggtcacaccc  
15 481 atgttg (SEQ ID NO:278).

## OR172

20 LOCUS AF179793 489 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus MSY173 pseudogene, partial sequence.  
ACCESSION AF179793  
KEYWORDS .

SOURCE Barbary ape.

25 ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

REFERENCE 1 (bases 1 to 489)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 489)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

35 TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

40 source 1..489  
/organism="Macaca sylvanus"  
/db\_xref="taxon:9546"  
gene <1..>489  
/gene="MSY173"  
/pseudo

45 BASE COUNT 95 a 120 c 104 g 170 t  
ORIGIN

1 cgtggccatc tgtaaccac tgtgtacac ggtcaccatg tctccccaga tgtgtttgct  
61 ccttttgctg ggtgtctatg ggatgggggt tttggggct gtgactcata tgggaacat  
121 aacgtttatg tcttttggtg gagacaacct tgtcaatcac tacatgtgtg acctccttc  
50 181 tctccttgag ctctcttgca acagcactta cataaattg ctggtggttt ttattattgt  
241 gaccaatggc attgggggtc caattgtcac cattttatc tctatggtt ttattcttc  
301 cagcattctc cacattagct ccacagaggg caggtctaaa gccttcagta cctgcagttc  
361 cacataattg tggatcgtc gtctttggg tcaggtgctt tcatgtacct caaccacct  
421 tctagtctac ccttggaacca ggggaacgtg tctccattt ttatactgc tgtaatgcc



481 atgtagatt (SEQ ID NO:279).

### OR173

5 LOCUS AF179794 481 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus olfactory receptor (MSY174) gene, partial cds.  
ACCESSION AF179794  
KEYWORDS .  
SOURCE Barbary ape.  
10 ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
REFERENCE 1 (bases 1 to 481)  
15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 481)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
25 source 1..481  
/organism="Macaca sylvanus"  
/db\_xref="taxon:9546"  
gene <1..>481  
/gene="MSY174"  
30 CDS <1..>481  
/gene="MSY174"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICKPLHYATIMSQPMCGFLMGVAGILGFVHGGIQTLFIAHLP  
35 FCGPNVIDHFMCDLVP LLELACTDHTLGPLIAANSGSLCFLIFSM LVASYVILCSL  
RTHISEGRHKVLSSCTSHIFVVILFFVPCS YLYLRPLTSFFPTDKAVTVFCTLFTPML" (SEQ ID  
NO:280).  
BASE COUNT 92 a 126 c 97 g 166 t  
ORIGIN  
40 1 tgtggccatc tgtaagccct tgcactatgc aaccatcatg agtcaaccta tgtgtggatt  
61 cctgatgggg gtggctggga ttctgggatt tgtgcatgga gggatccaga cttgttcat  
121 agcccaactta ccattctgtg gccctaattgt catcgaccac ttatgtgtg atttagtacc  
181 tctctagag ctggcctgca cagacactca cacctgggg cctctgatag ctgccaacag  
241 tggatcattg tgttccctca tttttccat gctggttgc tctatgtca tcacctctg  
45 301 ctccctaagg actcatatct ctgaaggcg tcacaaagt ctgtctagt gtacctctca  
361 tatcttgtt gtcatcttat tctttgtccc ttgtcatac ctgtatctaa gacctctaac  
421 ctcttcttc cccactgaca aagctgtgac tgtgtttgc acctattta cacctatgt  
481 g (SEQ ID NO:281).

### 50 OR174

LOCUS AF179795 402 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus MSY175 pseudogene, partial sequence.  
ACCESSION AF179795

KEYWORDS

SOURCE Barbary ape.

ORGANISM *Macaca sylvanus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
*Macaca*.

REFERENCE 1 (bases 1 to 402)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 402)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..402

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>402

/gene="MSY175"

/pseudo

BASE COUNT 89 a 105 c 77 g 131 t

ORIGIN

1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcatgca  
61 gcttggtcct ggggtgtggc ttgctggttt ctgctcacct tccaccact cctcttaggc  
121 ctaaactctg acttctgtgc ctgcctccaa cgctattaat catttctact gtgacactac  
181 tccactctcg cagatttctt gcactgacac acagctcctg gacaggatgg gattcatttc  
241 agcattgggt acactcttag tcacattggt aatggtgatg gtatcatgat atccctttct  
301 tatggcagtt gcattctcat gtatgttaag ccacgggtca aacaaaagat atattttca  
361 aagggaattt tgggtgctca cactctgtc gttccactt tg (SEQ ID NO:282).

**OR175**

LOCUS AF179796 487 bp DNA PRI 31-DEC-2000

DEFINITION *Macaca sylvanus* olfactory receptor (MSY176) gene, partial cds.

ACCESSION AF179796

KEYWORDS

SOURCE Barbary ape.

ORGANISM *Macaca sylvanus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
*Macaca*.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES                      Location/Qualifiers  
 source                      1..487  
                               /organism="Macaca sylvanus"  
                               /db\_xref="taxon:9546"  
 5                      gene                      <1..>487  
                               /gene="MSY176"  
                               CDS                      <1..>487  
                               /gene="MSY176"  
                               /codon\_start=2  
 10                      /product="olfactory receptor"  
                               /translation="VAICNPALLYALVVSPKVCRLLVSLTYLQSLITALTVSSCVFSVS  
                                   YCSSNIINH FYCDDVPLLALSCSDTYIPETAVFIFSGTNLFFSMTVVLLISYFNIVITI  
                                   LRIRSEGRQKAFSTCASHMIAVVVFYGTLLFMYLQPRSNHSLDTDKMASVFYTLIIP  
                                   ML" (SEQ ID NO:283).

15      BASE COUNT    104 a   123 c   87 g   173 t  
 ORIGIN

1    cgtggctatt tgcaaccctc tgctctacgc attagtgggtg tctccaaagg tatgtcgtct  
 61    gctgggtgcc ctacatacc ttcagagtct tatcacagcc cttactgtct cttcctgtgt  
 121   gttctctgtg tcatactgtt cttccaacat catcaacat ttttactgtg acgatgtccc  
 20    181   ttgctagca ttgtcgtgtt ctgataccta cattccagaa acagcagtgt ttatcttttc  
 241   agggaccaat ttgttttct ccatgaccgt tgttctgata tctacttca acattgttat  
 301   taccattttg aggatacgtt cctcagaagg acgacaaaaa gccttttcca cgtgtgcttc  
 361   tcacatgata gctgtgggtg tgttctatgg gactctcctt ttcattgtatt tgcaaccaag  
 421   gagtaatcac tcattagata ctgacaaaat ggccctcggtc ttctacacc tgatcatacc  
 25    481   tatgttg    (SEQ ID NO:284).

## OR176

LOCUS    AF179797    487 bp   DNA                      PRI    31-DEC-2000  
 30    DEFINITION    Macaca sylvanus olfactory receptor (MSY177) gene, partial cds.  
 ACCESSION    AF179797  
 KEYWORDS

SOURCE    Barbary ape.

ORGANISM    Macaca sylvanus

35                      Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
                               Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
                               Macaca.

REFERENCE    1 (bases 1 to 487)

AUTHORS    Giorgi,D.G. and Rouquier,S.P.

40    TITLE    The olfactory receptor gene repertoire in primates and mouse:  
                               Evidence for reduction of function in primates

JOURNAL    Unpublished

REFERENCE    2 (bases 1 to 487)

AUTHORS    Giorgi,D.G. and Rouquier,S.P.

45    TITLE    Direct Submission

JOURNAL    Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
                               1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES                      Location/Qualifiers

source                      1..487  
                               /organism="Macaca sylvanus"  
                               /db\_xref="taxon:9546"  
                               gene                      <1..>487  
                               /gene="MSY177"  
                               CDS                      <1..>487



BASE COUNT 83 a 144 c 105 g 155 t

ORIGIN

1 tgtggccatc tgttccccc tgcactacac cgcccatcg agcccatgc tctgtctcgc  
61 cctgggtggcg ctgtcctggg tactgaccac ctcccatgcc atgttacaca ctttactcat  
5 121 ggccagggtg tgtttttgtg cagacaatgt gatcccccac ttttctgtg atatgtctgc  
181 tctgctgaag ctggcctgct ctgacactca agttaatgaa ttggcgatat ttatcacggg  
241 agggctgatt cttgcatcc cattcctact catcctggg tcctatgcac ggattgtctc  
301 ctccatcctc aaggctccctt cgtctaaggg tatctgcaag gccttctcta cttgtggctc  
361 ccacctctct gtgggtgtcac tgttctatgg gaccgttatt ggtctctact tctgcccac  
10 421 agctaatagt tctactctaa aggagactgt catggctatg atgtacactg tggtgacccc  
481 catgctg (SEQ ID NO:288).

OR178

15 LOCUS AF179799 484 bp DNA PRI 31-DEC-2000

DEFINITION Macaca sylvanus olfactory receptor (MSY179) gene, partial cds.

ACCESSION AF179799

KEYWORDS

SOURCE Barbary ape.

20 ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

REFERENCE 1 (bases 1 to 484)

25 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)

30 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

35 source 1..484

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>484

/gene="MSY179"

40 CDS <1..>484

/gene="MSY179"

/codon\_start=2

/product="olfactory receptor"

/translation="CAICCPHYTTAMSPKLCILLLSLCWVLSVLYGLIHTFLMTTVT

45 FCGSRKIHYIFCEMYVLLRLACSDTQINHTVLIATGCFIFLIPFGFMIISYVLIVRAI

LRIPSVSKKYKAFSTCASHLGVVSLFYGTLCMVYLKPLHTYSVKDSVATVMYAVVTPM

M" (SEQ ID NO:289).

BASE COUNT 102 a 139 c 93 g 150 t

ORIGIN

50 1 atgtgccatc tgtgcccc tccactacac cacagccatg agccctaagc tctgtatctt  
61 actcctttcc ttgtgtggg tcttatctgt gctctatggc ctcatacaca ccttctcat  
121 gaccacgggtg accttctgtg ggtcacgaaa aatccactac atcttctgtg agatgtatgt  
181 attgtctgagg ctggcatgtt ccgacactca gattaatcac acagtgtctga ttgccacagg  
241 ctgctttatc ttctcatc cctttggatt catgatcatt tcctatgtgt tgattgtcag

301 agccatcctc agaataccct cagtctctaa gaaatacaaa gccttctcca ctgtgcctc  
 361 ccatttgggt gtagtctccc tcttctatgg gacacttgt atggataacc tgaagccct  
 421 ccatactac tctgtgaagg actcagtagc cacagtgatg tatgcggtgg tgacacccat  
 481 gatg (SEQ ID NO:290).

## OR179

LOCUS AF179800 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus MSY180 pseudogene, partial sequence.  
 10 ACCESSION AF179800  
 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 15 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 20 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 30 gene <1..>487  
 /gene="MSY180"  
 /pseudo

BASE COUNT 92 a 143 c 100 g 152 t

## ORIGIN

1 tgctgccata tgccaccctc tccattacac tgccatcatg aggggaagagc tctgtgtctt  
 61 cttagtggct gtagtctgaa ttctgtcttg tgccagctcc ctcttcaca cccttctct  
 121 gaccagctg tctttctgtg ctgcgaacac catccccac atcttctgtg acctgtctgc  
 181 cctgtcaag ctgtcctggc cagatatctt cctcaatgag ctggatcatg tcacagtagg  
 241 ggtggtgggc attaccctgc cattcatgtg tctcctggta tcatatggct acactggggc  
 301 caccatcctg aggggtccct caaccaaagg gatccacaaa gcattgtcca catgtgcctc  
 361 ccattctctc gtggtttctc tctattatgg gtcaatatt ggccagtaac atttccaac  
 421 tgtaagcagt tctattgaca aggatgttac tgtggctctc atgtacatcg tggtcacacc  
 481 cgtgttg (SEQ ID NO:291).

## OR180

LOCUS AF179801 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus MSY181 pseudogene, partial sequence.  
 50 ACCESSION AF179801  
 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>487

/gene="MSY181"

/pseudo

BASE COUNT 92 a 144 c 100 g 151 t

ORIGIN

1 tgctgccata tgcaccctc tccattacac tgccatcatg aggggaagagc tctgtgtctt  
61 cttagtggct gtatcttgaa ttctgtcttg tgccagctcc ctctctcaca cccttctcct  
121 gaccagctg tcttctgtg ctgcgaacac catccccac atcttctgtg acctgtctgc  
181 cctgtcctag ctgtctggt cagatatctc cctcaatgag ctggtcatgt tcacagtagg  
241 ggtggtggc attaccctgc cattcatgtg taccctggtg tcatatggct acactggggc  
301 caccatctg aggggtccct caaccaaagg gatccacaaa gcattgtcca catgtgcctc  
361 ccattctctc ggtgttctc tctattatgg gtcaatatt ggccagtaac atttccaac  
421 tgtaagcagt tctattgaca aggatgttac tgttgctctc atgtacatcg tggtcacacc  
481 cgtgttg (SEQ ID NO:292).

**OR181**

LOCUS AF179802 487 bp DNA PRI 31-DEC-2000

DEFINITION Macaca sylvanus olfactory receptor (MSY182) gene, partial cds.

ACCESSION AF179802

KEYWORDS

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Macaca.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

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/organism="Macaca sylvanus"
/db_xref="taxon:9546"
gene    <1..>487
/ gene="MSY182"
5  CDS    <1..>487
/ gene="MSY182"
/ codon_start=2
/ product="olfactory receptor"
10 / translation="VAICKPLHYMVMNNRVCTLLVLC SWVAGLMIIVPPLSLGLQLE
FCGSNAIDHFSCDAGPLLKISCSDTWVIEQIVILMAVFALIITLVCVILSYLYIVRTI
LRFPSVQQRKKAFSTCSSHMIVVSIAYGSCIFVYIKPSAKDEVAINKGVSVLTTSVAP
LL" (SEQ ID NO:293).
BASE COUNT  115 a  113 c  98 g  161 t
ORIGIN
15 1 tgtggccatc tgtaaaccce ttcattatat ggtcatcatg aacaacaggg tgtgtacctt
61 attagtctc tgcagttggg tggctggcct gatgatcatt gttccaccac tgagcttagg
121 cctccagctc gaattctgtg gctccaatgc cattgatcat ttagctgtg atgcaggtcc
181 tctcctaaag atctcatgct cagacacatg ggtaatagaa cagatagtta tacttatggc
241 tgtatttga ctcattatca ccctagtgtg tgtgattctg tctacttgt acatagtcag
20 301 aacaattctg aggttccctt ctgttcagca aaggaaaaag gccttttcta cctgttcac
361 ccacatgatt gtggtttcca tgcctatgg aagctgcac ttcgtctata tcaagccctc
421 tgcaaaagat gaagtgacca taaataaagg agtttcagtt ctactactt ctgtgcacc
481 cttgttg (SEQ ID NO:294).
25 OR182
LOCUS AF179803 487 bp DNA PRI 31-DEC-2000
DEFINITION Callithrix jacchus olfactory receptor (CJA169) gene, partial cds.
ACCESSION AF179803
30 KEYWORDS
SOURCE Callithrix jacchus.
ORGANISM Callithrix jacchus
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.
35 REFERENCE 1 (bases 1 to 487)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE The olfactory receptor gene repertoire in primates and mouse:
Evidence for reduction of function in primates
JOURNAL Unpublished
40 REFERENCE 2 (bases 1 to 487)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
TITLE Direct Submission
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France
45 FEATURES Location/Qualifiers
source 1..487
/organism="Callithrix jacchus"
/db_xref="taxon:9483"
gene <1..>487
/ gene="CJA169"
50 CDS <1..>487
/ gene="CJA169"
/ codon_start=2
/ product="olfactory receptor"

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/translation="VAICRPLYYSTVMSPQVCALILALCWVLTNVVALTHTLLMARLS  
FCVTGEIAHFFCDITPVLKLSCSDTHINEMMVFLGGTVLIVPFICIVTSYIHIVPAI  
LRVRTCGGAGKAFSTCSSHLICIVCIFYGTLSAYLCPPSIASEEKDIAAAALYTIVTP  
ML" (SEQ ID NO:295).

5 BASE COUNT 89 a 147 c 103 g 148 t  
ORIGIN

1 tgtggccatt tgccgcccc tgactactc cacagtcag agccccaag tctgtgccct  
61 aatccttga ttgtctggg tctcaccac ttgtgtgcc ctgactaca cactcctcat  
121 ggctcgactg tccttctgtg tgactgggga aatagctcac ttttctgtg acatcactcc  
10 181 tgcctgaag ctatcatgtt ctgacacca catcaacgag atgatggtt ttgtctggg  
241 aggcacagta ctatgttcc ctttatatg cattgtacc tctacatcc acattgtgcc  
301 tgctatcctg agggctcgaa cctgtggtgg ggcgggcaag gcctttcca cctgcagtc  
361 ccacctctgc attgtttgta tattctatgg gacctcttc agtgcctacc tgtgtctcc  
421 ctctattgcc tctgaagaga aggacattgc agcagctgca ctgtatacca tagtgactcc  
15 481 catgttg (SEQ ID NO:296).

### OR183

20 LOCUS AF179804 486 bp DNA PRI 31-DEC-2000  
DEFINITION Callithrix jacchus olfactory receptor (CJA170) gene, partial cds.  
ACCESSION AF179804  
KEYWORDS

SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
25 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
30 Evidence for reduction of function in primates

JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
35 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
source 1..486  
/organism="Callithrix jacchus"  
40 /db\_xref="taxon:9483"  
gene <1..>486  
/gene="CJA170"  
CDS <1..>486  
/gene="CJA170"  
45 /codon\_start=1  
/product="olfactory receptor"  
/translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS  
FCTDLEIPRFFCELNQVIHLACSDTFLNDVVMYLA AVLLGGGPLAGILYSYSKIVSSI  
RAISSAQGKYKAFSTCVSHLIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP  
50 ML" (SEQ ID NO:297).

BASE COUNT 96 a 135 c 102 g 153 t  
ORIGIN

1 gtggccatct gtcaccact gctacacac gtcaccatta accccagact gtgtggactg  
61 ctgttcttgg catcctgat cctgagtgcc ctgaattcct cattacaac ctaaatagtg

121 ctgcggcttt cctctgcac agacttgaa atccccgct tttctgca acttaacag  
 181 gtatccacc ttgctgtc tgacacttt ctaatgatg tggatgta ttggccgct  
 241 gtgtgctgg ggggtgtcc cctgcaggg attcttact ctactctaa gatagttcc  
 301 tccatagtg caatctatc agctcaggg aagtacaagg catttccac ctgtgtatc  
 361 cacatctaa ttgtctctt atttatggt acactcctag gtgtgtacct tagttctgct  
 421 gcaactggca actcacatc aagagctgca gcctcggga gtacactgt ggtcacccc  
 481 atgctg (SEQ ID NO:298).

## OR184

LOCUS AF179805 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA171) gene, partial cds.

ACCESSION AF179805

KEYWORDS

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>487

/gene="CJA171"

CDS <1..>487

/gene="CJA171"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICNPALLYMVTMSPQVCLLLLGVYGMGALGAVAHMGNIMFMT

FCAETLVNHYMCDILPILLESCNSSYINLLLVFIIVTIGIGVPIVTIFISYGFILSSI

LHISSAEGRSKAFSTCSSHIVVLLFFGSGAFMYLKPPSILPLDQGVSSIFYTAVVP

MF" (SEQ ID NO:299).

BASE COUNT 88 a 118 c 107 g 174 t

ORIGIN

1 cgtggccatc tgtaaccac tgggtacat ggaccatg tctcccagg tggcttgc  
 61 cctttgttg ggtgtctat ggatgggggc ttgggggct gtggctcata tgggaaacat  
 121 aatgttatg acctttgtg cagaaacct tgtaatcac tacatgtgtg acatccttc  
 181 cctccttgag ctctctgca acagctctta cataaattg ctgttggtt ttattattg  
 241 gaccattggc attgggtgc cattgtcac cattttatc tctatggtt ttattcttc  
 301 cagcattctc cacattagt ctgctgaggg caggctctaa gccttcagta cctgcagctc  
 361 ccacatagtt gtgtattgc tttctttgg gtcaggagct ttatgtacc tcaaacacc  
 421 ttctattcta cccttgacc aggggaaagt gtcctccatt ttatatact cgggtgtgcc  
 481 catgtt (SEQ ID NO:300).

## OR185

LOCUS AF179806 487 bp DNA PRI 31-DEC-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA196) gene, partial cds.

ACCESSION AF179806

KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>487

/gene="CJA196"

CDS <1..>487

/gene="CJA196"

/codon\_start=2

/product="olfactory receptor"

/translation="LAICHPLHYSSKMSLCCTLMLGCLWTTASLHALLHTLLRLD

FCASNVIPYFFCDLVPLLQLSCSDTRLNQLMIVLVGGLIILLPFLGILGSYTCIAAAV

LRVPSARGTWKAFSTCGSHLTMVILFYGTISGVYLRPSSSHSTDKDSLASVMYMVVTP

ML" (SEQ ID NO:301).

BASE COUNT 78 a 176 c 105 g 128 t

ORIGIN

1 cttggccatc tgccaccgcg tgcactactc ctccaagatg agcctgtgca gctgcaccct

61 aatgttgggc tgcttatgga ccaactgccag cctccatgcc ctctgcaca cccttctctt

121 ggcccggtg gacttctgtg ccagcaatgt tatccctac ttctctgtg acctcgttcc

181 cctgtccag ctctcctgtt ctgacaccg actcaaccag ctcatgattg tctgtgtggg

241 gggcctgac atcctcctgc ccttcttgg cattctcgtt tctacacat gcattgcagc

301 tgcagtgtc agagtccct ctgccagggg tacgtggaag gcctttcca cctgtggctc

361 ccactgacc atggtcatcc tctctatgg caccatctca ggggtctacc tgaggccctc

421 atctccac tccacagaca aggactcact agcctcagtg atgtacatgg tagtgacccc

481 catgctg (SEQ ID NO:302).

## OR186

LOCUS AF179807 487 bp DNA PRI 31-DEC-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA197) gene, partial cds.

ACCESSION AF179807

KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>487

/gene="CJA197"

CDS <1..>487

/gene="CJA197"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRSL

FCTDLEIPHFFCELNQVIHLACSDTFLNDVVMYLA AVLLGGGPLAGILYSYSKIVSSI

RAISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP

ML" (SEQ ID NO:303).

BASE COUNT 98 a 134 c 100 g 155 t

ORIGIN

1 tgttgccata tgtcacccac tgcactacac agtcaccatt aaccccagac tgtgtggact  
61 gctgggtctg gcatcctgga tctgagtg cctgaattcc tcattacaaa ccttaatatg  
121 gctgcggtt tctcttgca cagacttgga aatccccac ttttctgcg aacttaata  
181 ggatccacac ctgctctgt ctgacattt tcttaatatg gtggtgatgt attggccgc  
241 tgtgctgctg ggggggtggt ccctgcagg gattctttac tctactcta agatagtttc  
301 ctccatacgt gcaatctcat cagtcaggga gaagtacaag gcattttcca cctgtgtatc  
361 tcacatctta attgtctctt tatttatgg tacactccta ggtgtgtacc ttagttctgc  
421 tgcaactggc aactcacatt caagagctgc agcctcgggtg atgtacactg tggtcacccc  
481 catgctg (SEQ ID NO:304).

OR187

LOCUS AF179808 487 bp DNA PRI 31-DEC-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA198) gene, partial cds.

ACCESSION AF179808

KEYWORDS

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..487

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

10 gene <1..>487

/gene="CJA198"

CDS <1..>487

/gene="CJA198"

/codon\_start=2

/product="olfactory receptor"

15 /translation="IAICSPLLYNVIMSYHFCFRLTVGVYILGILGSTIHTSSMLRLF

LCKTNVINHYFCDLFPLLELSCSSTYINELLVLVLSALNLTLPALTILASYIFTIASI

LHIRSTEGRSKAFSTCSSHISAVAVFFGSAAFMYLQPSSVSSMDQGVSSVFYTTVVP  
ML" (SEQ ID NO:305).

20 BASE COUNT 101 a 138 c 87 g 161 t

ORIGIN

1 cattgccatc tgtagccctt tgctgtacaa tgcacatcg tctatcact tctgctccg

61 gctcacagtg ggagtttaca ttttaggcac ccttgatct acaattcaca ccagctctat

121 gttgagactc ttctgtgca aaactaatgt gattaacat tattttgtg atctctccc

181 tctcttgcaa ctctctgct ccagtaccta catcaatgaa ttactagtc tggcttgag

241 tgcattgaat atctgacgc ctgcctaac tctctggcc tcttatatct tcaccattgc

25 301 cagtatcctc cacattgct ccactgaggg caggtccaaa gccttcagca ctgcagctc

361 ccacatctca gctgtgtctg tcttcttgg atctgcagca ttcattgacc tgcagccatc

421 atctgtcagt tccatggacc aggggaaagt gtcattctgtg tttacacaa ctgtgtgccc

30 481 catgctg (SEQ ID NO:306).

## OR188

LOCUS AF179809 469 bp DNA PRI 31-DEC-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA199) gene, partial cds.

35 ACCESSION AF179809

KEYWORDS

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

40 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 469)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 469)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
50 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..469

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>469  
 /gene="CJA199"  
 CDS <1..>469  
 /gene="CJA199"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYTTVMSRGLCCVLVAASWMGGFVHSTVQTILTIRLP  
 FCGPNQVDNFFCDVPPVIKLACADTFVIELLMVSNGLISTSSFVVLISYTTILVKI  
 HSKEGRRKALSTCASHLMVVTFLFGPCSFYHPFSTFSVDKMVSVLYKVITPML" (SEQ ID

NO:307).

BASE COUNT 91 a 126 c 97 g 155 t

ORIGIN

1 tgttgctatc tgcaccccc tgcactacac cactgtcatg agtcggggat tatgctgtgt  
 61 gttggtgct gcctcctgga tgggaggatt tgtgactcc accgtccaga ccatttcac  
 121 tatcgtctg cctttttgtg ggccaaatca ggtggacaac tttttgtg atgtccccc  
 181 tgcacataa ctgcctgtg ctgacacttt tgtcattgaa ttgctcatgg tatctaacag  
 241 tgggttgatc tccaccagct cctttgtggt gctgattcc tctacacca ctatcctagt  
 301 caaggtcac tccaaggagg gaaggcgaaa ggcactctcc acatgtcct ctcaccttat  
 361 ggtggaata cttttggac cctgtagtt catctatcct catcctttct ctacatttc  
 421 tgtggacaag atggtgtctg tactctacaa ggttattact ccaatgcta (SEQ ID NO:308).

## OR189

LOCUS AF179810 488 bp DNA PRI 31-DEC-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA201) gene, partial cds.

ACCESSION AF179810

KEYWORDS

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..488

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

gene <1..>488

/gene="CJA201"

CDS <1..>488

/gene="CJA201"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICFPLRYMLLSHSICVTMIIVCWSISIAGALILTVFTMHL

PYKINHHFCEVPAVLKLACADTSFNDRDLFILGFIILLVPLSLILASYVFIFASI

FRIRSAQGRLKSFSTCASHVTVVTMFYGPAILMYMRPGSWYDPERDKKLALFYNNVSG

FL" (SEQ ID NO:309).  
BASE COUNT 84 a 145 c 105 g 154 t  
ORIGIN

5 1 cgttgccatt tgcctcccc ttcgtatat gctactcatg agccattcca ttgtgtcac  
61 gatgattata gttgttggc ccattagcat agctggggcc ctgactctca ctgtctcac  
121 catgcatctg ccttattgtg gccctacaa gataaaccac ttctctgtg aggtccctgc  
181 tgctctgaag ttggcctgtg cagacacatc tttaatgac aggtctggact tcattctggg  
241 ttcatcctg ctttgggtcc cactctccct cactctggcc tcttacgtct tcattcttgc  
301 ctctatcttc agaatccgct cagcgcaggg gaggtcaag tccttctcca cgtgtgcttc  
10 361 ccacgtcact gtgtgtacca tgtctatgg gccggccatc atcatgtaca tgaggcccg  
421 ttcttggtat gacccagagc gggacaagaa gctagcgtg ttctacaatg tggctcttgg  
481 cttctca (SEQ ID NO:310).

## OR190

15 LOCUS AF179811 487 bp DNA PRI 31-DEC-2000  
DEFINITION Callithrix jacchus olfactory receptor (CJA202) gene, partial cds.  
ACCESSION AF179811  
KEYWORDS  
20 SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
REFERENCE 1 (bases 1 to 487)  
25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

35 FEATURES Location/Qualifiers  
source 1..487  
/organism="Callithrix jacchus"  
/db\_xref="taxon:9483"  
gene <1..>487  
/gene="CJA202"  
40 CDS <1..>487  
/gene="CJA202"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLRYTATMNLRLCVQLVAGLWLVTYLHALLHTSLIAHLS  
45 FCAFNIHHFFCDLNPLRLSCSAVSFNVMIIFAVGGLLALTPLVCILVFYGLIFSTV  
LKITSTQKGKQRAASTCGCHLSVVVLFYGTAAIAVYFSPSSHTPESDTLSTVMYSVVAP  
ML" (SEQ ID NO:311).

BASE COUNT 86 a 152 c 94 g 155 t  
ORIGIN

50 1 tgtggcaatt tgccaccct tacgttacac tgccacaatg aacctgcgcc ttgtgtcca  
61 gctagtggct ggactgtggc ttgtactta cctccatgcc ctctgcata cttccctaat  
121 agcacatctg tccttctgtg ccttcaatat catccatcat ttctctgtg atctcaacc  
181 tctactacgg ctctcttctg ctgccgtctc ctcaacgta atgatcatt ttgcagtagg  
241 aggtctattg gctctcacgc ccttgtctg tatctctgta tttatggac ttatctctc

301 cactgtttctg aagatcacct ctactcaggg gaaacagaga gctgcttcca cctgcggctg  
 361 ccacctgtca gtagtggtgc tgtttatgg cacagccatt gccgtctact ttagccctc  
 421 atcctcccat acgctcgaga gtgacctct ctgaccgtc atgtattcag tggtgcccc  
 481 gatgctg (SEQ ID NO:312).

## OR191

LOCUS AF179812 491 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus PPY110 pseudogene, partial sequence.  
 10 ACCESSION AF179812  
 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 15 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 491)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 20 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 491)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 25 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..491  
 /organism="Pongo pygmaeus"  
 /db\_xref="taxon:9600"  
 30 gene <1..>491  
 /gene="PPY110"  
 /pseudo

BASE COUNT 92 a 118 c 105 g 176 t

## ORIGIN

35 1 cgtggccatc tgtaaccac tgtgtaaac ggtcaccatg tctccccaga tgtgttgc  
 61 ccttccactg ggtgtctatg ggtatgggggt tttggggct gtggttcata tgggaaacat  
 121 aatgtttatg tccttttg gagacaacct tgcatacac tatctgtgtg acatccttc  
 181 tctccttgag ctctctgca acagctctta cataaattg ctggtggtt ttattattg  
 241 gaccattggc attggggtgc caattgtcac cattttatc tcttatggt ttattcttc  
 40 301 cagcattctc cacattagct cacagagggc aggtcaggtc taaagccttc agtacctgca  
 361 gtcccatc aattgtgta tcgctttct ttgggtcagg tgcttcatg tacctcaaac  
 421 caccttctct tctaccctg gaccagggga aagtgtctc catttttat actgctgtg  
 481 tgcccatgt t (SEQ ID NO:313).

## OR192

LOCUS AF179813 480 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus PPY111 pseudogene, partial sequence.  
 50 ACCESSION AF179813  
 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.



REFERENCE 1 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..480  
 /organism="Pongo pygmaeus"  
 /db\_xref="taxon:9600"  
 gene <1..>480  
 /gene="PPY111"  
 /pseudo  
 BASE COUNT 81 a 141 c 100 g 158 t  
 ORIGIN  
 1 tgtggccatc tgctccccc tgcactacac catccatcat gagcccatg ctctgtctct  
 61 cccctttggc gctgtcctgg gtgctgacca cttccatgc catgttacac actttactca  
 121 tggccagggt gtgttttgt gcagacaatg tgatcccca cttttctgt gatatgtctg  
 181 ctctgtctga gctgtcctgc tctgacactc gagttaatga attggtgata ttatcatgg  
 241 gagggctcat tctgtcatc ccattcctac tcattcctgg gtcctatgca cgaattgtct  
 301 cctccatcct caaggtccct tctaagggtg tctgcaaggc ctctctact tgtggctccc  
 361 acctctctgt ggtgtccctg ttctatggga ccgttagtgg tctctactta tgcccatcgg  
 421 ctaatagttc tactctgaag gagactgtca tggctgtaat gtacactgtg gtgaccccca (SEQ ID NO:314).

# OR193

LOCUS AF179814 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus olfactory receptor (PPY112) gene, partial cds.  
 ACCESSION AF179814  
 KEYWORDS .

SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers  
 source 1..486  
 /organism="Pongo pygmaeus"  
 /db\_xref="taxon:9600"  
 gene <1..>486  
 /gene="PPY112"

CDS <1..>486  
 /gene="PPY112"  
 /codon\_start=1  
 /product="olfactory receptor"  
 /translation="CAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLRLS  
 FCADHIIISHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
 LQIPSTKGICKALSTCGSHLSVVTIYYGTIIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
 ML" (SEQ ID NO:315).

BASE COUNT 96 a 147 c 93 g 150 t

#### ORIGIN

1 tgtgccatct gtcacctct acattatgcc accatcatga gtcagagcca gtgtgtcatg  
 61 ctgggtggctg ggtcctgggt catcgcttgt gcgtgtgctc tttgcatac cctccttctg  
 121 gcccggtttt ccttctgtgc tgaccacatc atctctcact tcttctgtga ccttggtgcc  
 181 ctgctcaagc tgcctgtgc agacacctcc ctcaatcagt tagcaatctt tacagcagga  
 241 ttgacagcca ttatgcttcc attctgtgc atcctgggtt ctatgggtca cattgggggc  
 301 accatctcc agattccctc caccaagggc atatgcaaag cctgtccac ttgtggatcc  
 361 cactctcag tgggtgactat ctattatggg acaattatg gtctctattt tctaccccca  
 421 tccagcaaca ccaatgacaa gaacataatt gcttcagtga tatacacagt agtcactccc  
 481 atgttg (SEQ ID NO:316).

#### OR194

LOCUS AF179815 487 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus PPY113 pseudogene, partial sequence.

ACCESSION AF179815

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>487

/gene="PPY113"

/pseudo

BASE COUNT 107 a 130 c 95 g 155 t

#### ORIGIN

1 cactgccatt tgccaccctc taagataaac caatctcatg agacccaaaa tttgtggact  
 61 tatgactgcc ttctcttgga tcttgggctc tacggatgga atcattgatg ctgcagcgac  
 121 atttctctc tctactgtg ggtctcgga aatagccac ttctctgtg agttcccttc  
 181 catactaac ctctcatgca atgacacatc aatattgaa aaggtcttt tcactgtctg  
 241 tatagtaag atgtttttc ctgttgcaat catcatcgct tctatgctc aagttattct



# OR196

LOCUS AF179817 483 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus olfactory receptor (PPY115) gene, partial cds.

ACCESSION AF179817

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 483)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 483)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..483

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>483

/gene="PPY115"

CDS <1..>483

/gene="PPY115"

/codon\_start=1

/product="olfactory receptor"

/translation="VAVCHPLHYTLIMHGGLCLGLVAGCLVAGFMNSLMETIITFQLL

LCHNVINHFACE TLAVLRLACVDVSFNKAMVAISGFLVILLPCSLILFSYAHIVAAIL

HIPSAQGRRKAFGTCTSHLTVVCMCFGATMFTYMRPAGGSSLEKKNMVALFYAIVIPM

L" (SEQ ID NO:320).

BASE COUNT 86 a 136 c 115 g 146 t

ORIGIN

1 gtggccgtct gccaccact gcattacacg ctcatcatgc atggagggct gtgcctgggg

61 ctggtggcgc gctgcctggt ggctggttc atgaattccc tgaatgaaac aattatcacc

121 ttccagcttc tctgtgtca caatgttatt aatcactttg cctgtgagac cttagcagt

181 ctacgactag cctgtgtgga cgtctccttc aacaaggcca tgggtggccat ctcagggtt

241 ctggtgatcc tgcctccctg ttactgac ctattctct atgctcacat agttgctgcc

301 attcttcata ttctctgc ccaggacgc cgcaaagcct ttgggacttg cacgtctcac

361 ctactgtgg ttgcatgtg ctttggggct acaatgttca cctacatgag acctgcgggc

421 ggctcctccc tggaaaagaa gaatatggtt gcctctttt atgccattgt gattccaatg

481 ctt (SEQ ID NO:321).

# OR197

LOCUS AF179818 484 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus olfactory receptor (PPY116) gene, partial cds.

ACCESSION AF179818

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 484)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 484)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..484

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>484

/gene="PPY116"

CDS <1..>484

/gene="PPY116"

/codon\_start=2

/product="olfactory receptor"

/translation="VAVCHPLHYTLIMHGGLCLGLVAGCLVAGFMNSLMETIITFQLP

LCHNVINHAFACETLAVLRLACVDVSNKATVAISGFLVILLPCSLILFSYAHIVAAIL

RIPSAQGHRKAFGTCTSHLTVVCMCFGATMFTYMRPAGGSLEKENMVALFYAIVIPM

L" (SEQ ID NO:322).

BASE COUNT 85 a 138 c 116 g 145 t

ORIGIN

1 tgtggccgctc tgccaccac tgccattacac gctcatcatg catggagggc tgtgcctggg

61 gctggtggcc ggctgcctgg tgctggttt catgaatcc ctgatggaaa caattatcac

121 ctccagctt ccctgtgtc acaatgttat taatcacttt gcctgtgaga ccttagcagt

181 gctacgacta gcctgtgtgg acgtctcct caacaaggcc acggtggcca tctcagggtt

241 tctgtgatc ctgcttcct gttcactgat cctatttcc tatgtcaca tagttgctgc

301 cattctcgt attcctctg cccagggaca ccgcaaagcc ttgggacct gcacgtcga

361 cctcactgtg gtttgcattg gctttggggc tacaatgttc acctacatga gacctgcggg

421 tggctcctcc ctggaaaagg agaatatggt tgccctcttt tatgccattg tgattccaat

481 gctt (SEQ ID NO:323).

## OR198

LOCUS AF179819 479 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus PPY117 pseudogene, partial sequence.

ACCESSION AF179819

KEYWORDS .

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 479)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 479)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..479  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>479  
/gene="PPY117"  
/pseudo

BASE COUNT 100 a 115 c 91 g 173 t

ORIGIN

1 ttagccata tgcaaacct tatactatgt ggtcatcatg agccgaagga cagcactgt  
61 ctggtaatg atctcctggg ctgtgggctt ggtgcacaca ttaagccagt tatcatttac  
121 tgtgaacctg cctttttgt ggacctaag tagtagacag cttttttgt gatcttctc  
181 gagtgaccacaa acttgacctg ctggactctt acctcattga aatactaatt gtggtcaata  
241 gtggagtctt ttcctaagc actttctgtc tcttggtcag ctctacatc attattctg  
301 ttatggtttg gctcaagtct tgggctgcaa tggcgaaggc attttctacg ctggcttcct  
20 361 atattgcagt agtaatatata ttctttggac ctgcatctt catctatgtg tggcccttta  
421 ccatctatcc ttggataaa cttcttgcca tattttacac tgtttcacc cccatccta (SEQ ID NO:324).

OR199

25 LOCUS AF179820 487 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus olfactory receptor (PPY118) gene, partial cds.

ACCESSION AF179820

KEYWORDS .

SOURCE orangutan.

30 ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

35 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

40 TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>487  
/gene="PPY118"  
CDS <1..>487  
/gene="PPY118"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLARLS  
FCADHIISHFFCDL GALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI

LQIPSTKGICKALSTCGSHLSVVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:325).

BASE COUNT 95 a 147 c 94 g 151 t  
ORIGIN

5 1 tgtggccatc tgtcacccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctgggtggct gggtcctggg tcacgcttg tgcgtgtgct ctttgcata cctcctctc  
121 ggcccggctt tcctctgtg ctgaccacat catctctcac ttctctgtg acctgggtgc  
181 cctgctcaag ctgtcctgct cagacacctc cctcaatcag ttagcaatct ttacagcagg  
241 attgacagcc attatgcttc cattcctgtg catcctggtt tcttatgggc acattggggt  
10 301 caccatcctc cagattcctt ccaccaaggc catatgcaaa gccttgcca ctttggtgatc  
361 ccacctctca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc  
421 atccagaac accaatgaca agaacataat tgcttcagtg atatacacag tagtactcc  
481 catgttg (SEQ ID NO:326).

# 15 **OR200**

LOCUS AF179821 475 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus PPY119 pseudogene, partial sequence.  
ACCESSION AF179821

## 20 **KEYWORDS**

SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.

## 25 **REFERENCE 1 (bases 1 to 475)**

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished

## 30 **REFERENCE 2 (bases 1 to 475)**

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

## 35 **FEATURES Location/Qualifiers**

source 1..475  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>475  
/gene="PPY119"  
/pseudo

BASE COUNT 98 a 119 c 104 g 154 t  
ORIGIN

45 1 gtaccataa gcaaacctct ccactatgca atcatcatga actcatgcac atgtacaggc  
61 ccagtggtag gctcttgggt cattgggggt atgcactccc tgagccagtt agctttcact  
121 gtaagcttgc cctctgtgg cccaaacata gtggacagtt attattgcga ccttactttg  
181 gtatcaaac gtgcctgtac agatgcttat atccctgaag tgtgatgct tttggacggt  
241 ggtcttatgg gggtgacat ttttctttt gctgatctcc tacacgtca ttctgattac  
301 tgtgcagcga cattcctcag caggatggc caaggtcac agcactctga ctgccacat  
50 361 tgcgtgtgtg accgtgtct tggggccctg tatcttcac tatgctggc ctttcagcaa  
421 ctaccagtg gataacattt tgcctgtatt ctctgtagt ttacaccta tatta (SEQ ID NO:327).

## OR201

LOCUS AF179822 487 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus olfactory receptor (PPY120) gene, partial cds.

ACCESSION AF179822

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Pongo pygmaeus"

/db\_xref="taxon:9600"

gene <1..>487

/gene="PPY120"

CDS <1..>487

/gene="PPY120"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLHYATTMSQSQCVMVLVAGSWVIACACALLHTLLRLS  
FCADHIIPHFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIASVIYTVVTP  
ML" (SEQ ID NO:328).

BASE COUNT 95 a 150 c 94 g 148 t

ORIGIN

1 tgtggccatc tgtcacctc tacattatgc caccacatg agtcagagcc agtgtgtcat

61 gctggtggct gggctctctggg tcatcgcttg tgcgtgtgct ctttgcata ccctccttct

121 ggccccggctt tcctctcttg ctgaccacat catccctcac ttctctcgcg accttggtgc

181 cctgctcaag ctgtctctgct cagacacctc cctcaatcag ttagcaatct ttacagcagg

241 attgacagcc attatgcttc cattctcttg catcctgggt tcttatggtc acattgggggt

301 caccatcctc cagattcctt ccaccaaggg catatgcaa gcctgtcca cttgtggatc

361 ccacctctca gtggtgacta tctattatgg gacaattatt ggtctctatt ttctccccc

421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc

481 catgttg (SEQ ID NO:329).

## OR202

LOCUS AF179823 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC184) gene, partial cds.

ACCESSION AF179823

KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus



Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487

/gene="SSC184"

CDS <1..>487

/gene="SSC184"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICYPLHYTAIMREGLCAFLVAVSWIPSCASSLSHTLLLTPLP

FCDANTVHHFFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYTGATI

LRVPSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP

ML" (SEQ ID NO:330).

BASE COUNT 88 a 142 c 106 g 151 t

ORIGIN

1 tgttgccata tgttacccctc tccactacac tgccatcatg aggggaagggc tctgtgcctt

61 cttagtggtc gtattcttga ttccatcttg tgctagctcc ctcttcaca ccttctgct

121 gaccccgctg ctttctgtg atgcaaacac cgtccaccac ttcttctgtg acctgtctgc

181 cctgtcaag ctgtctgtc cagatatctt cctcaatgag ctggctcatgt tcacagtagg

241 ggtgggtggtc attaccctgc cattcatgtg tatcctggta tcatatggct acactggggc

301 cactatcctg aggggtccctt caaccaaagg gatccgcaaa gcgttgtcca tgtgtggctc

361 ccgtctctct gtggtgtctc tgtattatgg ctcaatatt ggccagtacc tttcccaac

421 tgaagcagt tccattgaca aggatgtcat tgtggctcta atgtacacag tggcacacc

481 catgctg (SEQ ID NO:331).

## OR203

LOCUS AF179824 488 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC185) gene, partial cds.

ACCESSION AF179824

KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..488

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

10 gene <1..>488

/gene="SSC185"

CDS <1..>488

/gene="SSC185"

/codon\_start=2

/product="olfactory receptor"

15 /translation="VAICYPLHYTAIMREGLCAFLVAVSWIPSCASSLSHTLLLTPLS

FCDANTVHHYFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYTGATI

LRVPSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP

ML" (SEQ ID NO:332).

BASE COUNT 89 a 142 c 106 g 151 t

20 ORIGIN

1 tgttgccata tgttacccctc tccactacac tgccatcatg agggaagggc tctgtgcctt

61 cttagtggtc gtatcttga ttccatcttg tgctagctcc ctctctcaca ccttctgct

121 gaccccgctg tcttctgtg atgcaaacac cgtccaccac tacttctgtg acctgctgc

181 cctgtcaag ctgtctgct cagatatctt cctcaacgag ctggtcatgt tcacagtagg

25 241 ggtggtggtc attaccctgc cattcatgtg taccctggta tcatatggct acactggggc

301 cactatcctg aggggtccctt caaccaaagg gatccgcaa gcggtgtcca tgtgtggctc

361 ccgtctctct gtggtgtctc tgtattatgg ctcaatatt ggccagtacc ttttccaac

421 tgaagcagt tccattgaca aggatgcat tgggctcta atgtacacag tggtcacacc

481 catgctgt (SEQ ID NO:333).

## OR204

LOCUS AF179825 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC186) gene, partial cds.

35 ACCESSION AF179825

KEYWORDS .

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

40 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487  
 /gene="SSC186"  
 CDS <1..>487  
 /gene="SSC186"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VATCHPLRYMVIMNPCLCSLLILLSPLTSVVNALLLSLMVLRLS  
 FCTDLEIPLFFCELAQVIQLACSDTLINNILIYFAACIFGGVPLSGIIFSYAQIASSI  
 LRMPSARRKYKAFSTCGSHLSMVLLFYRTGLGVYISSAVTDSPRKTAVASMMYSVGPQ  
 MV" (SEQ ID NO:334).

BASE COUNT 92 a 126 c 105 g 164 t  
 ORIGIN

1 tgtggccact tgtaccccc ttagatacat ggtcatcatg aaccctgcc tctgcagcct  
 61 gctgattctt cttctccgt tgactagcgt tgtgaatgcc cttcttca gcctgatggt  
 121 gttgaggctg tcctctgca cagatctgga aatcccgtc tcttctgtg aactggctca  
 181 ggcatccag cttgctgtt ctgacacct catcaataac atcctgatattttgcagc  
 241 ttgcatattt ggtgggtgtc cttgtctgtg aatcatattc tttatgctc agattgcctc  
 301 cttctatttt agaatgccat cagcagcag aaagtataaa gcctttcca cctgtgggtc  
 361 tcacctctcc atggtgtctt tttctatag gacagggttg ggggtgtaca ttagttctgc  
 421 agttactgac tcacctagga agactgcagt ggctcaatg atgtattctg tgggtcctca  
 481 aatggtg (SEQ ID NO:335).

## OR205

LOCUS AF179826 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC187) gene, partial cds.  
 ACCESSION AF179826  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Saimiri sciureus"  
 /db\_xref="taxon:9521"  
 gene <1..>487  
 /gene="SSC187"  
 CDS <1..>487  
 /gene="SSC187"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICLPLHYATIMSPMLSRSLVALSWVLTTFHAMLHTLLMARLR  
 FCADNVILHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLIIGSYARIVFSI

LKVPSSKGICKAVSTCGSHLSVVSIFYGTVIGLYLCPSANNSTLKETVMAVMYTVMAP  
ML" (SEQ ID NO:336).

BASE COUNT 84 a 140 c 104 g 159 t

ORIGIN

5 1 cgtggccatc tgcctcccc tacattacgc caccatcatg agcccatgc tgtctcgtc  
61 cctgggtggcg ctgtcctggg tgctgaccac ctccatgcc atgtgcaca cttactcat  
121 ggccagggtg cgttttctg cagacaatgt gatcctccac ttttctgtg atatgtctgc  
181 tctgctgaag ctggcctgct ctgacactcg agttaatgaa ttggtgatat ttatcatggg  
241 aggctcatt ctgtcatcc catttctact tatcattggg tcctacgcac gaattgtctt  
10 301 ctccatcctc aaggctcctt ctctaaggg tatctgaag gccgtctcta ctgtggctc  
361 ccacctctct gtggtgtcac tgttctatgg gactgtatt ggtctctact tatgcccatc  
421 agctaataat tctactctaa aggagactgt catggctgtg atgtacactg tgatggcccc  
481 catgctg (SEQ ID NO:337).

15 **OR206**

LOCUS AF179827 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC190) gene, partial cds.

ACCESSION AF179827

20 KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

25 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

30 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

35 FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487

40 /gene="SSC190"

CDS <1..>487

/gene="SSC190"

/codon\_start=2

/product="olfactory receptor"

45 /translation="VAICKPLHYTTIMSSKICLQLVLGCWVLGFLIIFPPLLLGLNLD

FCASNVDHFYFDTIPLLQISCTDTQLLERMGFISALVTLLVTLVMVIISYTYIALTI

LKIPSTSQRKKAFTSCSSHMIVISLSYGSCIFMYVKPSVKQRVFSKGISVLNTSVAP

LL" (SEQ ID NO:338).

BASE COUNT 112 a 124 c 91 g 160 t

50 ORIGIN

1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca

61 gcttgtgctt ggggtgctggg ttcttggttt tctcatcatc ttccaccac tcctcttagg

121 actaaatctt gactctgtg cctccaacgt cgtgatcat tctactttg acatatccc

181 gctcctgcag atttcttgca cagacacgca gctcctggag aggatgggat tcattcagc

241 gttggtgaca ctcttagtca cattggtaat ggtgataata tcatatactt atattgcct  
 301 gacaattcta aaaatccctt caactagtca gaggaaaaag gcttttcca cgtgttcttc  
 361 tcacatgatt gtgatatccc ttcttatgg cagctgcac ttcatgtatg ttaagccatc  
 421 agtcaaacaagggtatctt ttcaaaggg aatttcgggtg ctcaatacct ctgtgtctcc  
 481 acttttg (SEQ ID NO:339).

## OR207

LOCUS AF179828 485 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC191) gene, partial cds.

ACCESSION AF179828

KEYWORDS .

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..485

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>485

/gene="SSC191"

CDS <1..>485

/gene="SSC191"

/codon\_start=1

/product="olfactory receptor"

/translation="VAICHPLQYSVIMTTGYCGQLVAFSYMSGFMISVIKVVYFISHVA

FCGSNVMNHFFCDISPVLKLACKDMSTAELVDFALAIVILVIPLITTILSYIYIVSAI

LHIPSTQGRKKAFSTCASHLTVVIIFYTAMIFTYVRPRAIASFNSNKLMSAVYAVLTP

ML" (SEQ ID NO:340).

BASE COUNT 111 a 134 c 80 g 160 t

ORIGIN

1 gtgccattt gccacctct tcaactca gtcacatga ccacaggta ctgtggacag  
 61 ctggtggctt tctctacat gagtggttc atgatctctg tcatcaagg ctatttcatt  
 121 tcacatgttg ctctctgtg ctccaatgtt atgaaccact tttctgtga tatccacca  
 181 gtctctaaac tggcatgcaa agacatgtcc acagctgagc tagtggaatt tgccttagct  
 241 atcgctatc ttgtgatccc tctcattacc actatcctt cctatatcta cattgtctcc  
 301 gccattctgc atataccctc caccagggga aggaagaagg cctctccac ctgtgcacat  
 361 cactctactg tagtcataat ttttacaca gccatgatt ttacatatgt tcggcccgaa  
 421 gctattgcat catttaattc caacaaacta atgtcagctg tgtatgcagt cctcacaccc  
 481 atgct (SEQ ID NO:341).

## OR208

LOCUS AF179829 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC192) gene, partial cds.

ACCESSION AF179829

KEYWORDS .

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487

/gene="SSC192"

CDS <1..>487

/gene="SSC192"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICYPLHYTAIMREGLCAFLVAVSWIPSCASSLSHTLLLTPLS

FCDANTVHHFFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYTGATI

LRVPSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSSIDKDVIVALMYTVVTP

ML" (SEQ ID NO:342).

BASE COUNT 88 a 141 c 106 g 152 t

ORIGIN

1 tgttgccata tgttacccctc tccactacac tgccatcatg aggggaagggc tctgtgcctt

61 cttagtggct gtatcttga ttccatcttg tgctagctcc ctctctcaca cccttctgct

121 gaccccgctg tctttctgtg atgcaaacac cgtecaccac ttcttctgtg accttgctgc

181 cctgctcaag ctgtcctgct cagatatctt cctcaatgag ctggctcatgt tcacagtagg

241 ggtgggtggc attaccctgc cattcatgtg tatcctggta tcatatggct aactgggggc

301 cactatcctg agggctccctt caaccaaagg gatccgcaaa gcgttgcca tgtgtggctc

361 ccgtctctct gtgggtctct tgtattatgg ctcaatattt ggccagtacc tttccaac

421 tgtaagcagt tccattgaca aggatgtcat tgtggctcta atgtacacag tggtcacacc

481 catgctg (SEQ ID NO:343).

## OR209

LOCUS AF179830 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC193) gene, partial cds.

ACCESSION AF179830

KEYWORDS .

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487

/gene="SSC193"

CDS <1..>487

/gene="SSC193"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICYPLHYTAIMREGLCAFLVAVSWIPSCASSLSHTLLLTPLS

FCDANTVHHFFCDLAALLKLSCSDIFLNELVMFTVGVVVITLPFMCILVSYGYTGATI

LRVPSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSSIDKDVIVALTYTVVTP

ML" (SEQ ID NO:344).

BASE COUNT 88 a 143 c 106 g 150 t

ORIGIN

1 tgttgccata tgttacccctc tccactacac tgccatcatg aggggaagggc tctgtgcctt

61 cttagtggtc gtatcttggg ttccatcttg tgctagctcc ctctctcaca ccttctgct

121 gaccccgctg tctttctgtg atgcaaacac cgtccaccac ttcttctgtg accttgctgc

181 cctgctcaag ctgtctgctc cagatatctt cctcaatgag ctggcatgtg tcacagtagg

241 ggtgggtggc attaccctgc cattcatgtg taccctggtg tcatatggct acactggggc

301 caccatcctg aggggtccctt caaccaaagg gatccgcaaa gcgtgtgtcca tgtgtggctc

361 ccgtctctct gtgggtgtctc tgtattatgg ctcaatatt ggccagtacc tttcccaac

421 tgaagcagt tccattgaca aggatgtcat tgtggctcta acgtacacag tggtcacacc

481 catgctg (SEQ ID NO:345).

## OR210

LOCUS AF179831 486 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC194) gene, partial cds.

ACCESSION AF179831

KEYWORDS .

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..486

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

10 gene <1..>486

/gene="SSC194"

CDS <1..>486

/gene="SSC194"

/codon\_start=2

/product="olfactory receptor"

15 /translation="VAICHPHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS

FCTDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSI

RAISSAQGKYKAFSTCASHILIVSLFYGTLLGVYISSAATGNSHSSAAALVMYTVVTP

ML" (SEQ ID NO:346).

BASE COUNT 102 a 133 c 97 g 154 t

20 ORIGIN

1 tgtggccatc tgtaccccc tgcactacac agtcaccatt aacccagac tgttggtgact

61 gctggtctg gcatcctgga tctgagtgc cctgaattcc tcattacaaa ccttaatagt

121 gctgcggctt tcttctgca cagactgga aatccccac ttttctgcg aactaatca

181 ggcatcacat ctgcctgtt atgacttt ccttaatgat gtggtgatgt attggcagc

25 241 tatgtctgtg ggcgggtggt ccctcacagg aattattac tctactcta agatagtttc

301 ctccatcagt gcaatctcat cagctcaggg gaagtacaag gcgtttcca cctgtgcatc

361 tcacatctta attgtctct tatttatgg tacactccta ggtgtgtaca ttagtctgc

421 tgcaactggc aactcacatt caagtgtgc agccttggtg atgtactgt tggtcacccc

481 catgct (SEQ ID NO:347).

## OR211

LOCUS AF179832 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC195) gene, partial cds.

35 ACCESSION AF179832

KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

40 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
50 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"



gene <1..>487  
 /gene="SSC195"  
 CDS <1..>487  
 /gene="SSC195"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICNPALLYMVTMSPQVCLLLLLGVYGMGVLGAVAHMGNIMFMT  
 FCSENLVNHYMCVDVLPILLESCNSSYINLLVFIIVAIGIGVPIVTFISYGFILSSI  
 LHISSTEGRSKAFSTCSSHIIVVSLFFGSGAFMYLKPPSILPLDQGKVSSIFYTAVVP  
 MF" (SEQ ID NO:348).

BASE COUNT 92 a 116 c 105 g 174 t

#### ORIGIN

1 cgtggccatc tgtaaccac tgctgtacat ggtcaccatg tctcccagg tgtgttgct  
 61 cctttgttg ggtgtctatg ggatgggggt ttgggggct gtggctcata tgggaaacat  
 121 aatgtttatg acctttgtt cagaaaatct tgtcaatcac tacatgtgtg atgccttcc  
 181 cctccttgag ctctctgca acagctctta cataaattg ctgttggtt ttattattg  
 241 ggccattggc attgggggtgc caatgtcac cattttatc tctatggtt ttattcttc  
 301 cagcatttc cacattagct ccacagaggg caggctctaa gccttcagta cctgcagctc  
 361 ccacataatt gtggtatgc tttctttgg gtcaggagct tttatgtacc tcaaaccacc  
 421 ttctattcta cccctggacc aggggaaagt gtctccatt tttatactg cagtgggtgcc  
 481 catgttt (SEQ ID NO:349).

#### OR212

LOCUS AF179833 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis SBO213 pseudogene, partial sequence.  
 ACCESSION AF179833

#### KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>486

/gene="SBO213"

/pseudo

BASE COUNT 107 a 151 c 87 g 141 t

#### ORIGIN

1 cgtggccatc tgccaccctc tccactatcc catccgcatg agtagaagtg tgtgtgtgaa  
 61 gatgattgga ggctcttgga cgctgggggtc catcaactcc ttggcacaca cagtctatgc  
 121 cctcatatt cctactgca ggtctagagc cattgacatc ttctctgcg acatcccagc

181 catgttgctt ctgcctgta cggacacttg ggtctatgaa tacatggttt ttctaagtac  
 241 aagctgcctt ctctcttttc ttctctggc atcaccgctt cctatggccg agtcctattt  
 301 gctgtctacc atacgcattc aaaaaaggga agaaaaagg cctccaccac cattcaacc  
 361 catttaactg tagtgatctt ttactatgca cttttgtct acacctatct tcggcccagg  
 421 aatctccact caccatccga agacaagatc ctggcagtct tctacacat ccttaccct  
 481 atgctc (SEQ ID NO:350).

## OR213

LOCUS AF179834 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO214) gene, partial cds.  
 ACCESSION AF179834  
 KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>487

/gene="SBO214"

CDS <1..>487

/gene="SBO214"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICKPLHYTTIMSSKICLQLVLGCWVLGFLIIFPPLLLGLNLD

FCASNVDHFYCDTIPLLQISCTDTQLLERMGFISALVTLLVTLVMVIISYTYIALTI

LKIPSTSQRKKAFTSCSSHMIVISLSYGSCIFMYVKPSVKQRVSFSGISVLNTSVAP

LL" (SEQ ID NO:351).

BASE COUNT 112 a 125 c 92 g 158 t

ORIGIN

1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca  
 61 gcttgctgctt gggctgctggg ttcttggttt tctcatcatc ttccaccac tcctcttagg  
 121 actaaatctt gactctgtg cctccaacgt cggtgatcat ttctactgtg acactatccc  
 181 gctcctgcag atttctgca cagacacgca gtccttgag aggatgggat tcactcagc  
 241 gctggtgaca ctcttagtca cattggtaat ggtgataata tcataactt atattgcct  
 301 gacaattcta aaaatccct caactagtca gaggaaaaag gcttttcca cgtgtcttc  
 361 tcacatgatt gtgataccc ttcttatgg cagctgcatc tcatgtatg ttaagccatc  
 421 agtcaaaaca agggatatct ttcaaaggg aatttcggtg ctcaatacct ctgtgctcc  
 481 acttttg (SEQ ID NO:352).

## OR214

LOCUS AF179835 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO215) gene, partial cds.

ACCESSION AF179835

KEYWORDS ..

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>487

/gene="SBO215"

CDS <1..>487

/gene="SBO215"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICFPLHYTLLMSHSICVNTVIVCWSISIAGALIYTVFTLHLP

YCGPYKINHFFCEVPAVLKLACADTSFNDRLDFILGFLLLVPLSFILASYVLIFASI

FRIRSVQGRKLSFSTCASHVTVMFYGPAIIMYMRPGSWYDPEWDKKKEVLYNvisa

FL" (SEQ ID NO:353).

BASE COUNT 86 a 142 c 104 g 155 t

ORIGIN

1 cgttgccatt tgcctcccc ttactatac gctactcatg agccattcca ttgtgtcaa

61 cacggtcatt gtctgttggc ccattagcat agctggggcc ctgatctaca ctgtctcac

121 ctgtcatctg ccttattgtg gccctacaa gataaaccac ttctctgtg aggtccctgc

181 tgtctgaag ttggcctgtg cagacacatc tttaatgac aggtggact tcattttggg

241 ttctctctg ctttgggtcc cactctcct catctggcc tctacgtac tcattttgc

301 ctctatctc agaatccgct cagtgcaggg gaggtcaag tccttcca cgtgtgttc

361 ccacgtcact gtggtcacca tgttctacgg accggccatc atcatgtaca tgaggcccg

421 ttcttggtat gaccagagt gggacaagaa ggtagagggt ttgtacaatg tcattctgc

481 cttcttg (SEQ ID NO:354).

## OR215

LOCUS AF179836 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO216) gene, partial cds.

ACCESSION AF179836

KEYWORDS ..

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>487

/gene="SBO216"

CDS <1..>487

/gene="SBO216"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICQPLHYSTLLSPQACMTMVGTSWLTGHTATTHASLIFSLP

FPSHPMIPHFLCDILPVLRLASAGKHRSEISVMTATVVFMVPFSMIVTSYIRILGAI

LAMTSTQSRHKVFSTCSSHLLVVCLFFGTASITYIRPQAGSSVTTDRILSLFYTVITP

ML" (SEQ ID NO:355).

BASE COUNT 93 a 186 c 89 g 119 t

ORIGIN

1 tgttgcac tgccagcccc tgcactactc caccctcttg agcccacagg cctgcatgac

61 catgtgtggc acctcctggc tcacaggcat catcacagcc accaccatg cctccctcat

121 cttctctctg cccttcccca gccaccaat gatccacac tttctctgtg acatcctgcc

181 agtagtgaga ctggcaagtg ctgggaagca caggagttag atctcgtga tgacagctac

241 cgtagtcttc atcatgttcc ctttctctat gattgtcacc tttacatcc gcacctggg

301 tgccatccta gcaatgactt ccaccagag ccgcccacaag gtcttctcca cctgctcctc

361 ccattctgctt gtggtctgtc tcttcttgg aacagccagc atcacctaca tacggcccca

421 ggcaggctcc tctgtacca cagaccgcat cctcagtcct ttctacacgg tcatcacacc

481 catgctc (SEQ ID NO:356).

## OR216

LOCUS AF179837 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO217) gene, partial cds.

ACCESSION AF179837

KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

10 gene <1..>487

/gene="SBO217"

CDS <1..>487

/gene="SBO217"

/codon\_start=2

/product="olfactory receptor"

15 /translation="VAICHPLYYSTVMSPQVCALILVLCWVLTNVVALTHTLLMARLS

FCVTGEIAHFFCDITPVLKLSGSDTHINEMMVFLGGTVLIIPFLCIVTSYIYIVPAI

LRVTRTHGGAGKAFSTCSSHLCIVCVFYGTLFSAYLCPPSIASEDKDIATAAMYTIVTP

TL" (SEQ ID NO:357).

BASE COUNT 89 a 151 c 100 g 147 t

20 ORIGIN

1 tgtggccatt tgccaccccc tctactactc cacagtcacg agccccaag tctgtgcct

61 aatcctcgtg ttgtgtggg tctcaccacg cgttgtgcc tgaccaca cactcctcat

121 ggctcgactg tcctctgtg tgactggga aattgctcac ttttctgtg acatcactcc

181 tgctctgaag ctatcatgtt ctgacacca catcaatgag atgatggtt ttgtctggg

25 241 aggcacagta ctatcatcc ctttctatg cattgtcacc tctacatct acattgtgcc

301 tgctattctg aggggtccgaa cccatgggtg ggcgggcaag gcctttcca cctgcagttc

361 ccacctctgc attgtttgtg tgttctatgg gacctcttc agtgcctacc tgtgtcctcc

421 ctccatcgcc tctgaagata aggacattgc aacagcgca atgtatacca tagtgactcc

481 cacgttg (SEQ ID NO:358).

30 **OR217**

LOCUS AF179838 486 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO218) gene, partial cds.

35 ACCESSION AF179838

KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

40 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..486

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>486  
/gene="SBO218"  
CDS <1..>486  
/gene="SBO218"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICNPALLYMVTMSPQVCLLLLLGVYGMGVLGAVAHMGNIMFMT  
FCSENLVNHVMCDVLPILLESCNSSYINLLLVFIIVAIGIGVPIVTIFISYGFISS  
LHISSTEGRSKAFSTCSSHIIVVSLFFGSGAFMYLKPPSILPLDQGVSSIFYTAVVP  
C" (SEQ ID NO:359).

BASE COUNT 92 a 114 c 105 g 175 t

#### ORIGIN

1 cgtggctatc tgtaaccac tgctgtacat ggtcaccatg tctcccagg tgtgcttgc  
61 cctttgttg ggtgtctatg ggtgggggt ttgggggct gtggctcata tgggaacat  
121 aatgtttatg acctttgtt cagaaaatct tgtaaatcac tacatgtgtg atgtccttc  
181 cctccttgag ctctctgca acagctctta cataaattg ctgttggtt ttattattg  
241 ggccattggc attgggggtgc caattgtcac cattttatc tcttatggtt ttattcttc  
301 cagcattctc cacattagct ccacagaggg caggctctaa gccttcagta cctgcagctc  
361 ccacataatt gtggtatgc tttctttgg gtcaggagct tttatgtacc tcaaaccacc  
421 ttctatteta cccctggacc aggggaaagt gtcttcatt tttatactg cagtgggtgc  
481 atgttt (SEQ ID NO:360).

#### OR218

LOCUS AF179839 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO219) gene, partial cds.

ACCESSION AF179839

KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>487

/gene="SBO219"

CDS <1..>487

/gene="SBO219"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLQYSVIMTTGYCGQLVAFSYMSGFMISVIKVVYFISHVA

FCGSNVMNLFFCDISPVLKLACKDMSTAELVDFALAIIVLVIPLITTILSYIYIVSAI

LHIPSTQGRKKAFSTCASHLTVVIFYTAMIFTYVRPRAIASFNSNKLISAVYAVLTP  
ML" (SEQ ID NO:361).

BASE COUNT 111 a 136 c 78 g 162 t  
ORIGIN

5 1 tgtggccatt tgccaccctc ttcaatactc agtcatcatg accacagggt actgtggaca  
61 gctgggtggt ttctcttaca tgagtgggtt catgatctct gtcacaaagg tctatttcat  
121 ttacatggtt gctttctgtg gctccaatgt tatgaacctc ttttctgtg atatctcacc  
181 agtcctaaaa ctggcatgca aagacatgtc cacagctgag ctagtggact ttgctttagc  
241 tatcgtcatt ctgtgatcc ctctcattac cactatcctc tctatatct acattgtctc  
10 301 cgccattctg catataacct ccaccaggga aaggaagaag gccttctcca cctgtgcatc  
361 tcacctcact gtagtcataa tttttacac agccatgatt ttacatatg ttgggccag  
421 agctattgca tcatttaatt ccaacaaact aatctcagct gtctatgcag tcttcacacc  
481 catgcta (SEQ ID NO:362).

## 15 OR219

LOCUS AF179840 488 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri boliviensis SBO220 pseudogene, partial sequence.  
ACCESSION AF179840

## 20 KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

## 25 REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

## 30 REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

## 35 FEATURES Location/Qualifiers

source 1..488

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>488

/gene="SBO220"

/pseudo

BASE COUNT 112 a 126 c 92 g 158 t

ORIGIN

45 1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca  
61 gcttggtgctt ggggtgctggg ttcttggttt tctcatcatc ttccaccac tctcttagg  
121 actaaatctt gacttctgtg cctccaacgt cgtgatcat tctactgtg acatatccc  
181 gctcctgcag atttctgca cagacacgca gctcctggag aggatgggat tcactcagc  
241 gctggtgaca ctcttagtca cattggtaat ggtgataata tcataactt atttgcct  
301 gacaattcta aaaatccctt caactagtca gaggaagaaag gcttttcca cgtgttctc  
50 361 tcacatgatt gtgatatccc ttcttatgg cagctgcat ctcatgtat gtaagccat  
421 cagtcaaaca aagggtatct tttcaaagg gaattcggg gctcaatacc tctgtgtgc  
481 cacttttg (SEQ ID NO:363).

## OR220

LOCUS AF179841 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO221) gene, partial cds.

ACCESSION AF179841

KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>487

/gene="SBO221"

CDS <1..>487

/gene="SBO221"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICLPLHYATIMSPMLSRSLVALSWVLTTFHAMLHTLLIARLR

FCADNVIFHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLIIGSYARIVFSI

LKVPSSKGICKAVSTCGSHLSVVSIFYGTVIGLYLCPSANNSTLKETVMAVMYTVMAP

ML" (SEQ ID NO:364).

BASE COUNT 85 a 139 c 103 g 160 t

ORIGIN

1 cgtggccatc tgccctcccc tacattacgc caccatcatg agccccatgc tgtctcgctc

61 cctgttgagg ctgtcctggg tgctgaccac ctccatgcc atgtgcaca ctttactcat

121 agccagggtg cgttttgtg cagacaatgt gatctccac ttttctgtg atatgtctgc

181 tctgctgaag ctggcctgct ctgacactcg agttaatgaa ttggtgatat ttatcatggg

241 aggcctcatt ctgtcatcc catttctact tatcattggg tctacgcac gaattgtctt

301 ctccatctc aaggtccctt ctctaaggg tatctgcaag gccgtctcta ctgtggctc

361 ccactctct gtggtgtcac tgttctatgg gactgttatt ggtctctact tatgcccatc

421 agctaataat tctactctaa aggagactgt catggctgtg atgtacactg tgatggcccc

481 catgctg (SEQ ID NO:365).

## OR221

LOCUS AF179842 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO222) gene, partial cds.

ACCESSION AF179842

KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis



Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>487

/gene="SBO222"

CDS <1..>487

/gene="SBO222"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICNPLLYMVTMSPQVCLLLLGVYGMGVLGAVAHTGNIVFLT

FCAGNLVNHMCDILPILLESCNGSYINVLVIFIVVTIGIGVPIVAIFISYGFILSSN

LHISSAEGRSKAFSTCSSHIIAVSLFFGSGAFMYLKPSSVLPLDQGVSSLFYTIVVP

MF" (SEQ ID NO:366).

BASE COUNT 86 a 120 c 105 g 176 t

ORIGIN

1 cgtggccatc tgtaaccac tgctgtacat ggtcaccatg tctcccagg tgtgtttgct

61 ccttttgtg ggtgtctatg ggatgggggt ttgggggct gtggctcata caggaaatat

121 agtgtttcta accttttgtg caggcaacct tgtcaatcac tacatgtgtg acatccttc

181 ccttcttgag ctctcctgca atggctctta cataaatgtt ctggatcatc ttattgtgt

241 gaccattggc attgggggtc ccattgtgc cattttatc tctatgggt ttattcttc

301 cagcaatctc cacattagtt ctgctgaggg caggctctaa gccttcagta cctgcagctc

361 ccacataatt gcagtttctc tttcttcgg gtcaggagct ttatgtacc tcaaaccctc

421 ttcggttta cccctggacc aggggaaagt atcctccctg ttttatacta ttgtggtgcc

481 catgtt (SEQ ID NO:367).

## OR222

LOCUS AF179843 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO223) gene, partial cds.

ACCESSION AF179843

KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 10 gene <1..>487  
 /gene="SBO223"  
 CDS <1..>487  
 /gene="SBO223"  
 /codon\_start=2  
 /product="olfactory receptor"  
 15 /translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS  
 FCTDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIIYSYSKIVSSI  
 RAISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSSHSSAAALVMYTVVTP  
 ML" (SEQ ID NO:368).

BASE COUNT 101 a 134 c 98 g 154 t

20 ORIGIN  
 1 tgtggccatc tgtcaccccc tgcactacac agtcaccatt aaccccagac tgtgtggact  
 61 gctgggtctg gcatcctgga tctgagtc cctgaattcc tcattacaaa ccttaatagt  
 121 gctgcggctt tcttctgca cagactgga aatccccac ttttctgcg aacttaatca  
 181 ggcatcacat ctgcctgtt atgacctt ccttaatgat gtggtgatgt attggcagc  
 25 241 tatgtctgctg ggcggtggtc ccctcacagg aattatttac tctactcta agatagtttc  
 301 ctccatacgt gcaatctcat cagctcaggg gaagtacaag gcgtttcca cctgtgcatc  
 361 tcacatctta attgtctct tatttatgg tacactccta ggtgtgtacc ttagttctgc  
 421 tgcaactggc aactcacatt caagtgtgc agccttggtg atgtacactg tggtcacccc  
 30 481 catgctg (SEQ ID NO:369).

## OR223

LOCUS AF073959 649 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR1-72M15 olfactory receptor gene,  
 partial cds.

35 ACCESSION AF073959

KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 40 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional

45 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 50 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

FEATURES Location/Qualifiers

source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR1-72M15"  
 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="IADIGFTSTTIPKVLQTIHTQSKFISFSGCITQIFFFIVFGCLD  
 NLLLSVMAYDRFVAICHPLHYVIMNSCFVMLALGSWIVSVMSSLPETLTVLRLSFC  
 TNMEIPHFCDLPEVLKLACSDTLVNNIVTYSITIVIAGFPPSGILLSYSKIFSSILR  
 IPSAGGKYKAFSTCGSHLLVVFLFYSNGLGVYLSSAATSSSRMSLVASLMYSIVTP" (SEQ ID

NO:370).

BASE COUNT 139 a 171 c 119 g 220 t

ORIGIN

1 catagctgac atcggttca cctccaccac tatccccaag gttctgcaga ctatccacac  
 61 acagagcaaa ttcattctt tctcgggctg catcacacag atattttct tcattgtgt  
 121 tggatgcctg gacaattac tctatcagt gatggcctat gaccgcttg tggccatctg  
 181 ccatccctg cactatgtgg tcatcatgaa ttctgcttc tgtgtgatgc tggctcttgg  
 241 atcatggata gtcagcgtca tgagttccct acctgagacc ttgactgtgt taagactatc  
 301 ctctgtaca aacatggaaa ttccacactt ttctgtgat ctcccgaag tcctgaagct  
 361 tgctgttct gacaccctg ttaataacat tgtgacatat tctataacca tagtcatagc  
 421 tggtttcca tctctggga tctattgtc ttattctaag atttctcct ccatcctaag  
 481 aattcctca gctgggggca agtacaaagc ctttctacc tgtgggtctc atcttttgg  
 541 ggtctctta tctatagca atggtcttgg ggtctacac agctctgcag ccacatcatc  
 601 ttctagaatg agtctagtgt cctcactgat gtacagcata gtcactccc (SEQ ID NO:371).

## OR224

LOCUS AF073960 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR1-72M16 olfactory receptor gene,  
 partial cds.

ACCESSION AF073960

KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

FEATURES                      Location/Qualifiers  
 source                      1..649  
                               /organism="Mus musculus domesticus"  
                               /sub\_species="domesticus"  
                               /db\_xref="taxon:10092"  
                               /clone="OR1-72M16"  
 mRNA                      <1..>649  
                               /product="olfactory receptor"  
 CDS                        <1..>649  
                               /note="region between transmembrane domains TM2 and TM7."  
                               /codon\_start=2  
                               /product="olfactory receptor"  
                               /translation="FSDFCFSSVTIPKLLQNMQSQVPSIPYAGCLAQMYFFLLFADLE  
                               SFLLVAMAYDRYVAICFPLHYTSIMSPKLCCLVALSWLLTTVISLSHTLLMARLSFC  
                               ANNVIPHFFCDMSALLKLACSDIQINKLMIFILGGLVIIVPFLIFSSYARIVSSILK  
                               VPSSRSIRKAFSTCGSHLSVVSIFYGTIIGLYLRPSANNSTIKETVMAVMYTVVTP" (SEQ ID

NO:372).

BASE COUNT    129 a   184 c   120 g   216 t

ORIGIN

1 cttctctgac ttctgtttt cctctgtgac cattcccaaa ttgctgcaga acatgcaaag  
 61 ccaagtcca tccataacct atgcaggttg cctggcacia atgtacttt ttctgtttt  
 121 tgcagatctc gagagcttc ttctgtggc catggcctat gatcgctatg tggccatctg  
 181 cttcccccta cactatacta gcatcatgag ccccaagctg tgtctctgcc tgggtggcact  
 241 atcttggtga ctgaccacag tcctctctt gtcacacaca ctgctcatgg ctgggtcttc  
 301 cttctgtgct aacaatgtga ttctctactt ttctgtgat atgtcagctc ttctgaagtt  
 361 agcctgctct gacattcaga tcaataagtt gatgatattt atcttgggag gactgtctat  
 421 tattgtccca ttctgtctga tattttcatc ctatgcacga atagtgtcct ccattctcaa  
 481 ggtcccctct tctagaagca tccgcaaggc cttctccacc tgggttccc acctctctgt  
 541 ggtgtctctt ttctatggga caatcattgg tctctatta cgtccatcag ctaataattc  
 601 aaccattaag gagactgtca tggctgtgat gtacacggtg gtgaccctc (SEQ ID NO:373).

## OR225

LOCUS    AF073961    649 bp   DNA                      ROD    12-JUL-1999  
 DEFINITION    Mus musculus domesticus clone OR10M olfactory receptor gene,  
                   partial cds.  
 ACCESSION    AF073961  
 KEYWORDS  
 SOURCE        western European house mouse.  
 ORGANISM      Mus musculus domesticus  
                   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
                   Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE    1 (bases 1 to 649)  
 AUTHORS      Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE        Mouse olfactory receptor genes orthologous to human pseudogenes are  
                   potentially functional  
 JOURNAL        Unpublished  
 REFERENCE    2 (bases 1 to 649)  
 AUTHORS      Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE        Direct Submission  
 JOURNAL        Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
                   UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,

France  
 FEATURES Location/Qualifiers  
 source 1..649  
 5 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR10M"  
 mRNA <1..>649  
 /product="olfactory receptor"  
 10 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 15 /translation="FSDLCFSSVTMPKLLQNMQSQDSSITYAGCLTQMYFFLLFGDLE  
 SFLLVAMAYDRYVAICFPLHYMSIMSPSLCVSLVLLSWVLTTFHAMLHTLLMARLSFC  
 EDNVIPHFFCDMSALLKLSCSDTHVNELVIFVTGGLILVIPFVLILVSYARIVSSILK  
 VPSARGIRKAFSTCGSHLSVVSIFYGAIIGLYLCPADNSTVKETVMAMMYTVVTP" (SEQ ID

NO:374).

BASE COUNT 120 a 185 c 141 g 203 t

ORIGIN

1 ctctctgat ctctgcttt cctctgtcac aatgccaaa ttgctgcaga acatgcagag  
 61 ccaggactca tccatcacct atgcaggatg cctgacacaa atgtacttt tcttgctctt  
 121 tggagacctt gagagcttcc tcctgtggc catggcctat gaccgctatg tggccatctg  
 181 cttcccccct cattacatga gcatcatgag cccagcctc tgtgtgagtc tgggtgctgt  
 241 gtctgtgggt ctgaccactt tccatgccat gctgcatacc ctgctcatgg ccagattgtc  
 301 attctgtgag gacaatgtga tccccactt tttctgtgac atgtctgctc tgcgaagct  
 361 gtctgtctct gacactcacg ttaatgaatt ggtgatattt gtcacaggag gcctgactct  
 421 tgcattcca ttgtgtctca tcctgtgtc ctatgcacga attgtgtcct ccattctcaa  
 481 ggtcccgctc gctcgaggca tccgtaaagc cttctccacc tgggggtccc acctgtctgt  
 541 ggtgtcactg ttctatgggg caatcattgg tctgtactta tgcacatcag ctgataactc  
 601 tactgtgaag gaaactgtca tggccatgat gtacacagtg gtgactccc (SEQ ID NO:375).

## OR226

35 LOCUS AF073962 649 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR11M olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073962  
 KEYWORDS .  
 40 SOURCE western European house mouse.  
 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 45 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 50 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS

UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR11M"

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/product="olfactory receptor"

CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"

/translation="FSDLCFSSVTMPKLLQNMQSQDPSIPYGGCLAQIFFMFLFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKVCTFLVLLWILTPHATMQILLTVRLSFC  
ENNVFLNFFCDIFVLLKLACSDTYVNDLMILIMGGLIIVIPFLIVISYARIISSTLK  
VPSTQGIHKVFSTCGSHLSVVSIFYGTIIGLYLCPSGNNFSLKGSAMAMMYTVVTP" (SEQ ID

NO:376).

BASE COUNT 143 a 160 c 122 g 224 t

ORIGIN

1 ttctctgac ctctgcttt cctctgtcac aatgccc aaa ttgctgcaga atatgcagag  
61 ccaggaccca tccatccct atggagggtg cctggcaca atattcttct ttatgcttt  
121 tggagacatg gaaagctcc ttctgtagc catggcctat gaccgctatg tggccatctg  
181 ctccctctg cattacacta gcatcatgag tcttaaggtc tgtactttc tagtgctact  
241 gttgtggata ctgacaacac cacatgccac aatgcaaatt ctgctcacag taagactgtc  
301 ttttgtgag aacaatgtgt ttctcaactt ttctgtgac atattgttc tcttaaagct  
361 ggctgtctca gacactatg ttaagtatt gatgatactt atcatgggag ggctcatcat  
421 tgtattcca ttctgtctca ttgttatatc ctatgcaagg atcatctcct ctactcttaa  
481 ggttccatct actcaaggca tccacaaggc ctctctacc tgtggctctc atctgtctgt  
541 ggtgtctctg ttcatggga caattattgg tcttacta tgtccatcag gtaataatt  
601 cagtctaaag gggtctgcca tggctatgat gtacacagtg gtgactccc (SEQ ID NO:377).

OR227

LOCUS AF073963 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR12M olfactory receptor gene,  
partial cds.

ACCESSION AF073963

KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

# FEATURES Location/Qualifiers

5 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR12M"  
10 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
15 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQSQDTSISYAGCLTQMYFLLVFGDLE  
SILLVMA YDRYVAVCFPLHYMSIMSP T LCVCLLVLSWVFTVLYSMLHTLLLSRLSFC  
EDNLIHHFFCDISALLKLACSDIHINELMIFIMGGLVSIIPFLLIVVSYIQIVYSILK  
ISSAHVLHKIFSTCGSHLSVVSIFYGTIFALYLCPSANNSTVKEISMAMMCTVVTP" (SEQ ID  
20 NO:378).  
BASE COUNT 134 a 159 c 122 g 234 t  
ORIGIN

1 cttctctgat cttctgtttt cctctgtcac aatgcccaag ttgtacaga acatgcagag  
25 61 ccaggacacg tccatctcct atgctggctg tctgacacaa atgtactttt tattggttt  
121 tggagacctg gagagcatcc ttcttttggg catggcttat gaccggtatg tggctgtctg  
181 ctccccctt cattacatga gcatcatgag cccacacac tctgtgtgtc tgctagtgtt  
241 atcctgggta ttactgtgc tgaattctat gttgcacact ctactctgt ctgattgtc  
301 attctgtgag gataactga tccaccactt ttctgtgac atatcgccc tgctcaagtt  
361 ggcttgcctt gacattcata ttaatgaatt aatgatattt atcatgggag ggcttgttag  
30 421 catcatccca ttctactca ttgtgtgtc ctatatacaa attgtctact ccattctaaa  
481 gatttctct gctcatgttt tacacaagat cttctccacc tctgggtccc acctgtctgt  
541 agtctcactg ttctatggga caattttgc tctctacta tgccatcag ctaataactc  
601 tactgtgaag gagattcca tggccatgat gtgcacagtg gtgactccc (SEQ ID NO:379).

## OR228

LOCUS AF073964 649 bp DNA . ROD 12-JUL-1999  
DEFINITION Mus musculus domesticus clone OR15-71M19 olfactory receptor gene,  
partial cds.

40 ACCESSION AF073964

### KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
45 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

50 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

5 FEATURES Location/Qualifiers  
 source 1..649  
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 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR15-71M19"  
 10 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FSDIGFISTTIPKMLVNIQTQSKSISYAECITQIYFFMLFGGMD  
 15 ILLLTVMAYDRFVAICHPLHYSVIMNPQLSGLLVLVSWFISFSYSLIQSLLMLRLSFC  
 TNQIIKHFYCEYSRALTACSDTLINHILLYILICVLGFIPFSGILYSYCKIVSSILR  
 20 IPSTDGKYKAFSTCGSHLSVVSIFYGTGLGVYLSDDVTSSSGKDVVASVMTVVTP" (SEQ ID  
 NO:380).  
 BASE COUNT 153 a 151 c 112 g 233 t  
 ORIGIN

1 cttttctgac attggttca tcttacaac tatccctaag atgttggtga atatccaaac  
 25 61 acagagcaag tccatctct atgcagaatg catcaccag attattttt tcatgctctt  
 121 tggaggcatg gacatacttc tctcaccgt gatggcctat gaccgattg tggccatctg  
 181 tcacccctt cactattcag tcattatgaa tccccaacta agtggcttgc tggttcttgt  
 241 atcatggttt attagctttt catattctct gatacagagt ctattgatgc tgcggttgc  
 301 cttctgtaca aatcagataa ttaaacactt ttactgtgaa tatttagag ccctcactat  
 361 agcctgtca gacacactaa tcaatcatat cctctttat attctgatat gtgtccttgg  
 421 cttcatcct ttctcaggga tctttattc atactgtaa attgttctt ctatttgag  
 481 aattcatca acagatggaa aatataaagc atttctacc tgtgggtctc atctatcagt  
 541 gggttcttta ttctatggga caggccttgg tgtgtacct agttctgatg taacttctc  
 35 601 ctctgggaag gacgtggtgg cctcagtaat gtatacagtg gtcaccct (SEQ ID NO:381).

## OR229

LOCUS AF073965 643 bp DNA ROD 12-JUL-1999  
 40 DEFINITION Mus musculus domesticus clone OR15-71M20 olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073965  
 KEYWORDS .  
 SOURCE western European house mouse.  
 ORGANISM Mus musculus domesticus  
 45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 643)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 50 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 643)



AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

FEATURES Location/Qualifiers  
 source 1..643  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR15-71M20"  
 mRNA <1..>643  
 /product="olfactory receptor"  
 CDS <1..>643  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDLCFSSVTVPKLLKDLLSAKKTISIEGCLAQVFFVFFPSGTE  
 ACLLSVMAYDRYAAICHPLLYGQVMRNELCVRLVVISWGWASLNATIIVLLAVNLDFC  
 GAQTIHHYTCELPALFPLSCSDISITVVVLLCSSLLHGLGTFIPIFFSYARIVSAILS  
 ISSTTGRSKAFSTCSSHLAAVTLFFGSGFLCYLMPPSGSSLDLLLSLQYSAVTP" (SEQ ID

NO:382).

BASE COUNT 98 a 203 c 142 g 200 t

ORIGIN

1 gttcgtagat ctctgcttct catccgtcac ggtaccgaaa ctgctgaagg acctcctatc  
 61 ggcgagaaaa accattctcaa tagaaggctg cctggctcag gtctttttg tgtttttcc  
 121 ttctggtact gaagcctgcc tgctctctgt catggcttat gaccgctatg ctgccatctg  
 181 ccatccctg ctctacggcc aggtgatgag aaatgagtg tgtgaaggc ttgtggtcat  
 241 ctcatggggc gtggcctctc tcaacgcaac catcatcgtg ctctggctg tcaacctgga  
 301 ctctgtggg gctcaacca ttcaccacta cacctgtgag ctgcctgcc tttccctt  
 361 gtctgttcc gatatctcca tcaactgctg cgtctgctt tgcctcagct tgcgtcatgg  
 421 gctgggaacc ttatcccta tctctctc ctatgccgcg attgtctccg ccattctgag  
 481 catcagttcc accaccggga ggagcaaggc ctctccacc tgccttccc acctcgtgc  
 541 agtgaccttg ttcttgggt ctggcttct ttgctatctc atgccgcctt ctggtcttc  
 601 tctggacttg ctctgtcgt tgcagtacag cgcagtcacg ccc (SEQ ID NO:383).

## OR230

LOCUS AF073966 643 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR15-71M21 olfactory receptor gene,  
 partial cds.

ACCESSION AF073966

KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 643)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 643)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS

5 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

source 1..643

/organism="Mus musculus domesticus"

10 /sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR15-71M21"

mRNA <1..>643

/product="olfactory receptor"

15 CDS <1..>643

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="LVDIFFSSVTIPKMLANHLLGSKAISFGGCMAMQMYFMISLGNTD

20 SYILAAMAYDRAVAISRPLHYATIMSPQLCVLLVAGSWVIANANALPHTLLTARLSFC

GNKDVANFYCDITPLLQLSCSDIRFNVKMMYLGVGVSFVPLLCIIISYVRVFSTVLRV

PSTKGFLKALSTCGSHLTVVSLYYGTVMGMYFRPLTSYSLKHALITVMYTAVTP" (SEQ ID

NO:384).

BASE COUNT 133 a 171 c 148 g 191 t

25 ORIGIN

1 cctgttgac atctcttct cctctgtaac tattccaag atgctggcca accatctct

61 aggtagcaag gccatctct tgggggatg tatggcacag atgtactca tgatatcatt

121 gggaacaca gacagtata tactagctgc aatggcatat gaccgagctg tggctatcag

30 181 tcgcccgtt cattatgcaa caattatgag tcacaaact tgtgtctgc tgggtgctgg

241 gtctgggtg attgcaaat ctaatgact gcccacacc ctactcacg ctgattgtc

301 ctctgtggc aataaggatg tggcaactt ctactgtgac attacacctt tctccagct

361 gtctgttct gacatcgtt tcaatgtgaa gatgatgtac ctgggggtg gggcttctc

421 tgtgccactg ctgtgcatc tcactccta tgtccgggtc ttccacag tcttgcgggt

35 481 tccatctacc aagggttcc tgaaggcctt gtccacctgt ggctctacc tgacagtgg

541 gtcttctgt tatgggacag tcattggcat gtatttcgg cccctgacca gttacagtct

601 gaagcatgca ttgataactg tgatgtacac ggcagtgacc cca (SEQ ID NO:385).

## OR231

40 LOCUS AF073967 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR15-71M24 olfactory receptor gene,  
partial cds.

ACCESSION AF073967

KEYWORDS .

45 SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

50 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

5 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

source 1..649

10 /organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR15-71M24"

mRNA <1..>649

15 /product="olfactory receptor"

CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

20 /translation="LVDICFTTVIVPQMLVNLLTQRKTILFAQCLTQMYFFVAFGITD  
SFLLAAMAIDRYVAICNPLHYNTVMSPRRRCRLVVASWAVSHLHSLTHTILMGRLSFC  
GPNVIHHFFCDVQPLLTLSCSDTSINELLAFTEGSVVIMSPFILLLSLISIFTRTVLR  
VPSGEGRYKVFSTCGSHLTVVALFYGTIISVYIRPSSTYSVTKDRVVTVIYTVVTP" (SEQ ID

NO:386).

25 BASE COUNT 134 a 180 c 128 g 207 t

ORIGIN

1 cctggtggac atctgcttta ccactgtcat cgtgccacag atgttagtga acttgctgac  
61 acagagaaag acaatctctt ttgccagtg cctcactcaa atgtattct ttgtggctt  
121 tggattaca gacagttcc ttgggtgc gatggccatt gaccgctatg ttgctattg  
30 181 caatccgctt cattacaaca cagtcattgag tccagggcgc tgctgctgc tgggtgtggc  
241 atctggggca gtgtccatc ttactccct caccacaca atttcattg gtcgcctc  
301 ttctgtgga ccaatgtca ttcatcactt ctttgtgat gtccagccac tgctgacact  
361 ctctgtctt gacacctcta tcaatgagct ctgggcctc acagagggct ctgttataat  
421 catgagccct ttatcttat tttgtctct tatactata ttactcgga ctgttctgag  
35 481 ggcccttca ggggaaggaa ggtacaaagt ttctctacc tggggctc acctcacagt  
541 ttagcactg ttcatggaa ccataatc agtgacatt cgccctcat ccactactc  
601 agtgacaaag gaccgagtg tcatgtcat ctatacagta gttaccca (SEQ ID NO:387).

## OR232

40

LOCUS AF073968 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR18M olfactory receptor gene,  
partial cds.

ACCESSION AF073968

45 KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

50 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are

potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

# FEATURES Location/Qualifiers

source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR18M"  
 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACLTQMYFFSVFGSLE  
 IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVCVVVFCWVFVIFYAMFHTLLLARLSFC  
 KNNVIPHFFCDISALLKLACSDVYINELMILILGGFLLVISLLLIIVSYVQIVSSILR  
 ISSTRAIHKLFSTCGSHLSVVSIFYGTIIGLYLCPSANNSTEKETAMSLMYTVVTP" (SEQ ID

NO:388).  
 BASE COUNT 136 a 155 c 121 g 237 t  
 ORIGIN

1 ctctctgat ctctgcttt cctctgtcac aatgcccaag ttgctgcaga acatgcagat  
 61 ccaggacaca cccatatcct atgtggcttg tctgacacaa atgtactttt tcatgtgttt  
 121 tggaaagtctg gagatatctc ttctgtagt cctggcctat gaccgctatg tggccatctg  
 181 ttaccctt caatatcca gcatcatgag ccccaatctc tgtgtgtgtg tgggtgtgtt  
 241 ctgctgggta ttattgtgt ttatgccat gttcacaca ctactctgg ctagattgtc  
 301 attttgaag aacaatgtga tcccacactt ttctgtgac atatctgcc tctgaagtt  
 361 ggcagtctct gatgtttata ttaatgaatt aatgatactt atctgggag ggtttctct  
 421 tgtcatctca ctcttactca tcattgtatc ctatgtacaa attgtcct caatttaag  
 481 gatttctct actcgggcta tcataagct ctctccacc tgtggctcac acctgtctgt  
 541 ggtctcactg ttctatggga caattattgg tctgtactta tgtccatcag ctaataactc  
 601 tactgaaaag gagactgcca tgtcctgat gtacacagtg gtgactccc (SEQ ID NO:389).

## OR233

LOCUS AF073969 649 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR1M olfactory receptor gene, partial  
 cds.  
 ACCESSION AF073969  
 KEYWORDS  
 SOURCE western European house mouse.  
 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
5 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

10 FEATURES Location/Qualifiers  
source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
15 /clone="OR1M"  
mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
20 /codon\_start=2  
/product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNIQSQDPSIPYAGCLAQTYFFMVFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKLCGCLMLLLWMLTTSHAMMHTLLAARLSFC  
ENNVILNFFCDLFLVLLKLACSDTYVNELMIFIMSSLLVIPFFLIVMSYARIIASILK  
25 VPSIQGIYKVFSTCGSHLSVVTLFYGTIIGLYLCPSGNNSTVKGTVMAMMYTVVTP" (SEQ ID

NO:390).  
BASE COUNT 142 a 161 c 123 g 223 t  
ORIGIN  
1 cttctctgat ctctgctttt cctctgtcac aatgccccaa ttgctgcaga atatacagag  
30 61 ccaggaccca tccatccctc atgcaggctg cctggcacia acatactctt ttatggtttt  
121 tggagatatg gagagcttcc ttctgtggc catggcctat gaccgctatg tggccatctg  
181 cttccctctg cattacacca gcatcatgag tcccaaactc tgtggtgtc taatgctgct  
241 attgtggatg ctaacaacat cccatgccat gatgcatact ctccttgcag caagattgtc  
301 ttttgtgag aacaatgtga tctcaattt ttctgtgac ctattgttc tcctaaagct  
35 361 ggcttgctca gacactatg ttaatgagtt gatgatatt ataatgagtt ccctcctcat  
421 tgttatcca ttttctca ttgtcatgtc ttatgcaagg atcattgcct ccattcttaa  
481 ggttccatct attcaaggga tctacaaggt cttctccacc tgtggtccc atctgtctgt  
541 ggtgaccttg tttatggga caattattgg tcttactta tgcctatcag gtaataattc  
40 601 cacagtaaag gggactgtca tggccatgat gtacacagtg gtgactccc (SEQ ID NO:391).

## OR234

LOCUS AF073970 649 bp DNA ROD 12-JUL-1999  
45 DEFINITION Mus musculus domesticus clone OR21M olfactory receptor gene,  
partial cds.  
ACCESSION AF073970  
KEYWORDS .  
SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
50 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are potentially functional

JOURNAL Unpublished

5 REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
10 France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"

/sub\_species="domesticus"

15 /db\_xref="taxon:10092"

/clone="OR21M"

mRNA <1..>649

/product="olfactory receptor"

CDS <1..>649

20 /note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="FADICFTSASIPKMLVNIQTKNKVITYEGCISQVFFILFGVLD

25 NFLAVMAYDRYVAICHPLHYMVIMNRRLCGFLVLGSWVTTALNSLLQSSMALRLSFC

TDLKIPHFVCELNQLVLLACNDTFPNDMVMYFAAILLGGGPLAGILYSYSKIVSSIRA

ISSSQGKYKASSTCASHLSVVSFLFYSTLLGAYLSSSFTQNSHSTARASVMYSVVTP" (SEQ ID

NO:392).

BASE COUNT 150 a 156 c 122 g 221 t

ORIGIN

30 1 cttgcagac atctgcttta cttctgctag catcccaaag atgctagtga atatacagac

61 aaagaacaag gtgataacct atgaagggtg catttctca gttattcttt tcatactatt

121 tggagtttta gataacttc ttctagctgt gatggcctat gaccgatatg tggcaatctg

181 tcacctctg cactatatgg tcatcatgaa ccgccgcctc tctggatttt tagttttggg

35 241 gtcttgggtc acaacagcat tgaatcctt gctgcagagt tcaatggcac tgcggctgtc

301 cttttgtaca gacttgaaaa ttcccactt tgtttgtgag cttaatcaac tggctact

361 tgcctgtaat gacaccttc ctaatgacat ggtgatgtac ttgcagcta tactgctggg

421 tgggtgtcct cttgctggca tccttactc ttattctaag atagtttctt ccatacgtgc

481 aatctcatca tcacagggga agtataaagc atcctccacc tgtgcatccc acctctcagt

40 541 tgtttcatta ttctattcta cactctggg tgcgtatctt agttctctt ttacacaaaa

601 ctacacatca actgcacgag catctgttat gtacagtgtg gtcaccccc (SEQ ID NO:393).

## OR235

45 LOCUS AF073971 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR22M olfactory receptor gene, partial cds.

ACCESSION AF073971

KEYWORDS

SOURCE western European house mouse.

50 ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

00747155-12100

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS

UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5, France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"

/sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR22M"

mRNA <1..>649

/product="olfactory receptor"

CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="FSDLCFSSVTMPKLLQNMQSQDSSITYAGCLTQMYFFLLFGDLE

SFLLVAMAYDRYVAICFPLHYMSIMSPSLCVSLVLLSWVLTTFHAMLHTLLMARLSFC

EDNVIPYFFCDMSALLKLSCSDTHVNELVIFVTGGLILVIPFVLILVSYARIVSSILK

VPSARGIRKAFSTCGSHLSVVSIFYGTIIGLYLCPADNSTVKETVMAMMYTVVTP" (SEQ ID

NO:394).

BASE COUNT 121 a 184 c 140 g 204 t

ORIGIN

1 ctctctgat ctctgcttt cctctgtcac aatgccc aaa ttgctgcaga acatgcagag

61 ccaggactca tccatcacct atgcaggatg cctgacacaa atgtacttt tcttgcctt

121 tggagacctt gagagcttcc tcctgtggc catggcctat gaccgctatg tggccatctg

181 ctccccctt cattacatga gcatcatgag cccagcctc tgtgtgagtc tgggtctgct

241 gtctgggtg ctgaccactt tccatgcat gctgcatacc ctgctcatgg ccagattgtc

301 attctgtgag gacaatgtga tcccctactt tttctgtgac atgtctgctc tgcagaagct

361 gtctgctct gacactcacg ttaatgaatt ggtgatatt gtcacaggag gcctgacct

421 tgcattcca tttgtgctca tcctgtgtc ctatgcacga attgtgctc ccattctcaa

481 ggtcccgct gctcgaggca tccgtaaagc ctctccacc tgggggtccc acctgtctgt

541 ggtgtcactg ttctatggga caatcattgg tctgtactta tgccatcag ctgataactc

601 tactgtgaag gaaactgtca tggccatgat gtacacagtg gtgactccc (SEQ ID NO:395).

## OR236

LOCUS AF073972 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR25M olfactory receptor gene, partial cds.

ACCESSION AF073972

KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
5 potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Direct Submission  
10 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
source 1..649  
15 /organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR25M"  
mRNA <1..>649  
20 /product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
25 /translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
LLLLVAMAYDRYVAICFPLHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLLTRL SFC  
KNNVIPHFFCDLSALLKLACSDIHINELMIMIIGALVVILPFLLIIVSYAHIVSSILK  
VPSTRGIHKVFSTCGSHLSVVSIFYGSVIVLYLCPSSNNSTVKDTVMSMMYTVVIP" (SEQ ID  
NO:396).  
30 BASE COUNT 136 a 163 c 118 g 232 t  
ORIGIN  
1 ctctactgac ctctgctttt ctactgtcac aatgcccaat ttctgcaaa acatgcagag  
61 ccaagtatca tccattccct atgcaggctg ccttgcacaa atgtacttct ttgtgtttt  
121 cggtgatgtt gagagtttac tcctgttgc catggcctat gaccgttatg tggccatctg  
35 181 ctccctctt cattatacca gaatcatgag cccaaacctc tgtgtgagta tgggtctgct  
241 gtctctgggca ctgacaacat tgtatgcat gttgcacact ttgtcttaa ctagggtgtc  
301 ttctgtaaa aacaatgtga tcccccat ttctgtgac ctttctctc tctgaagct  
361 ggctgtctct gatattcaca ttaatgagtt aatgataatg ataattggag cactgttgt  
421 tatacttcca ttctactca tcatagtgtc ttatgcgcac attgtctct ccatctcaa  
40 481 agtcccttca actcgaggca tccacaaggt cttctccact tgtgggtctc atctgtctgt  
541 ggtgtcactg ttctatgggt cagtcattgt tctgtactta tgtccatcat ctaataactc  
601 tactgtgaag gatactgtca tgtctatgat gtacactgtg gtgattccc (SEQ ID NO:397).

## OR237

45 LOCUS AF073973 649 bp DNA ROD 12-JUL-1999  
DEFINITION Mus musculus domesticus clone OR27M olfactory receptor gene,  
partial cds.  
ACCESSION AF073973  
50 KEYWORDS .  
SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus



Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"

/sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR27M"

mRNA <1..>649

/product="olfactory receptor"

CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE

SLLLVAMAYDRYVAICSPHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLLTRLSTFC

KNNVIPHFFCDLSALLKLACSDIHINELMIMIIGALVVILPFLLIIVSYAHIVSSTLK

VPSTRGIHKVFSTCGSHLSVVSFLFYGSVIVLYLCPSSNNSTVKDVTMSMMYTVVTP" (SEQ ID

NO:398).

BASE COUNT 136 a 165 c 117 g 231 t

ORIGIN

1 cttcactgac ctctgctttt ctactgtcac aatgcccaat ttctgcaa acatgcagag

61 ccaagtatca tccattccct atgcaggctg cctgcacaa atgtacttct tttgtttt

121 tgggtgatgt gagagtttac tcctgttgc catggcctat gaccgttatg tggccatctg

181 cttccctctt cattatacca gaatcatgag cccaaacctc tgtgtgagta tgggtctgct

241 gtctctggga ctgacaacat tgtatgceat gttgcacact ttgctcttaa ctagggtgtc

301 ttctgtaaa aacaatgtga tccccattt ttctgtgac cttctgctc tctgaagct

361 ggctgtctct gatattcaca ttaatgagtt aatgataatg ataattggag cactgttgt

421 tatactcca ttctactca tcatagtgc ttatgcgcac attgtctcct ccacttcaa

481 agtcccttca actcgaggca tccacaaggt ctctccact tgtgggtctc atctgtctgt

541 ggtgtcactg ttctatgggt cagtcattgt tctgtactta tgtccatcat ctaataactc

601 tactgtgaag gatactgtca tgtctatgat gtacactgtg gtgactccc (SEQ ID NO:399).

## OR238

LOCUS AF073974 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR28M olfactory receptor gene,  
partial cds.

ACCESSION AF073974

KEYWORDS

SOURCE western European house mouse.

09747155-122100

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"

/sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR28M"

mRNA <1..>649

/product="olfactory receptor"

CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="VVDICYTSSGVPQMLAHFLMEKKTISFALCGTQLFFALTGGTE

FLLLTAMAYDRYVAVCNPLRYTVVMNPRLCMGLAGVSWFVGVVNSAVETAVTMYLPTC

GHNVLNVHACETLALVRLACVDITLNQVVILASSVVVLMIPCSLVLSYAHIVAAIMK

IRSTQGRRKAFETCASHLTVVMSYGMALFTYLPASTASAEQDKVVVIFYALVTP" (SEQ ID

NO:400).

BASE COUNT 119 a 183 c 166 g 181 t

ORIGIN

1 agtgggtggac atctgctaca cctccagtgg ggtcccccag atgctggcac acttctcat

61 ggagaaaaag accatctctt ttgccctatg tgggacccag ctctctttg ctctgactct

121 tgggggaact gagtttctgt tgctgactgc catggcctat gaccgctatg ttggtgtctg

181 taatccatta cggtagacag tggtagatgaa cccaaggctc tgcattgggtc tagcaggtgt

241 ctcttggttt gtgggtgtag ttaattctgc tgtggagaca gcagtcacca tgtaccttcc

301 cacctgtggg cacaatgtac tcaaccatgt ggcctgtgag acactggcac tggtagact

361 ggcctgtgtg gacatcacc ccaaccaagt ggtgatactg gcttctagt tgggtgtgct

421 gatgataccc tgctctctgg tctctctgct ctatgccac attgtagctg ccatcatgaa

481 gatccgttct acccagggac gccgcaaagc cttgagacc tgtgcctccc atctgactgt

541 ggtctccatg tcttatggga tggcctctt cacctacctg cagcctgcct ccacagcctc

601 tgctgagcag gacaaggtgg tagtgatctt ctatgctttg gtcaccccc (SEQ ID NO:401).

## OR239

LOCUS AF073975 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR29M olfactory receptor gene,  
partial cds.

ACCESSION AF073975

KEYWORDS .

SOURCE western European house mouse.

ORGANISM *Mus musculus domesticus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; *Mus*.

5 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

10 REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
15 France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"

/sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR29M"

20 mRNA <1..>649

/product="olfactory receptor"

25 CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="FVDLCQSSVIMPKMLEKFVMVKSVISFAECMAQFYLFDFVAVSE

CHMLAVMAYDRYVAICNPLLYNVTMSYKVCSSWMVGVYVGLICATGETVCLLRLLFC

30 KADDINHIFCDLLPLLEQSCSNTFINEILGLSFSSFNTPALITLSSYIFIIASILR

IPSTEGRSKAFSTCSSHILAVAVFFGSLAFMYLQPSVSSMDQGVSSVFYITIVVP" (SEQ ID

NO:402).

BASE COUNT 143 a 159 c 130 g 217 t

ORIGIN

35 1 ttctgtgac ctctgccagt ccagtgtcat catgccaaa atgctggaga aattgtcat  
61 ggtgaagagt gtcatttctt tgcagaatg catggctcag tttacttat ttgatgttt  
121 tgctgttca gactgtcaca tgctggctgt catggcttat gatcgctatg ttccatctg  
181 taaccccttg ctatataatg ttaccatgtc ttacaaagtg tgttctgga tggtagtggg  
241 ggtgtatagt gtaggcttga ttgtgccac aggggaaaca gtctgcctgc ttgactgct  
40 301 attctgcaa gctgatgaca taaaccacta ctctgtgat ctttaccac tactggaaca  
361 atcctgtcc aatacatta tcaatgaaat actaggactg tcctcagtt catttaatac  
421 tactgtcca gcttgacca tcctcagttc ctacatctc atcatagcca gcatcctccg  
481 cattcctcc actgaaggca ggtccaaagc ctacagcacc tgcagctccc acatctggc  
541 tgttgctgc ttcttgggt ctttagcatt catgtacct cagccatcat cagtcagtc  
45 601 catggaccaa gggaaagtgt cctctgtgtt ttataccatt gttgtgccc (SEQ ID NO:403).

## OR240

LOCUS AF073976 649 bp DNA ROD 12-JUL-1999

50 DEFINITION *Mus musculus domesticus* clone OR2M olfactory receptor gene, partial  
cds.

ACCESSION AF073976

007475E-12400

KEYWORDS

SOURCE western European house mouse.

ORGANISM *Mus musculus domesticus*

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; *Mus*.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS

UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5, France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"

/sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR2M"

mRNA <1..>649

/product="olfactory receptor"

CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="FTDLCFSSVTMPKLLQNMQSQVPSIPYAGCLTQMYFFLFFGDLE

SFLLVAMAYDRYVAICFPLHYTSIMSPRLCVSLVLLSWLLTMSHSMMLHTLLLTRLSSFC

ENNVIPHFCDLSALLKLACSDIHINELVILIIGGLVVILPFLLVTVSYARISSILK

VPSTRGIHKVFSTCGSHLSVVSFLFYGTIIGLYLCPSANNSTLKDVTVMMLMYTVVTP" (SEQ ID

NO:404).

BASE COUNT 126 a 177 c 123 g 223 t

ORIGIN

1 cttcactgac ctctgctttt cctctgtcac aatgccaag ttgctgcaga acatgcagag

61 ccaagttcct tcaatcccct atgcaggctg cctgacacaa atgtacttct tttgtttt

121 tggagatctt gagagcttcc tcctgtggc catggcctat gaccgatatg tagccatctg

181 ctccctctt cattacacca gcattatgag ccccaggctc tgtgtgagtc ttgtgtctgt

241 gtctgtgtg ctgaccatgt cccattccat gctgcacact ttgctcttaa ctagggtgtc

301 ttctgtgaa aacaatgtga tccccattt ttctgtgat ctgtctgctc tgctgaagct

361 ggcctgctct gatattcaca ttaatgaatt ggtgatattg atcataggag ggcttgtgt

421 tatacttcca ttctactcg tcacagtgtc ttatgcacgc atcatctcct ccatttcaa

481 ggtcccttca actcgaggca tccacaaggc cttctccact tgtggttctc acctgtctgt

541 ggtgtcactg ttctatggga caattattgg cctctactta tgtccatctg ctaataactc

601 tactctaaag gacactgtca tgtctctgat gtacactgtg gtaactccc (SEQ ID NO:405).

OR241

LOCUS AF073977 650 bp DNA ROD 12-JUL-1999

DEFINITION *Mus musculus domesticus* clone OR3M olfactory receptor gene, partial cds.

ACCESSION AF073977

KEYWORDS .

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 650)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

source 1..650

/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR3M"

mRNA <1..>650

/product="olfactory receptor"

CDS <1..>650

/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=3  
/product="olfactory receptor"

/translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACLQMYFFSVFGSLE  
IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVVCVVVFCWVFVIFYAMFHTLLLARLSFC  
KNNVIPHFFCDISALLKLACSDVYINELMILILGGFLLVTSLLLIIVSYVQIVSSILR  
ISSTRAIHKLFSTCGSHLSVVSIFYGAIIGLYLCPANNSTKETAMSLMYTVVTP" (SEQ ID

NO:406).

BASE COUNT 135 a 157 c 122 g 236 t

ORIGIN

1 cctctctga tctctgttt tctctgtca caatgccaa gttgctgcag aacatgcaga  
61 tccaggacac acccatatcc tatgtggctt gtctgacaca aatgtacttt ttacgtgtt  
121 ttggaagtct ggagatattc cttctgtag tctggccta tgaccgctat gtggccatct  
181 gttaccct tcaatattcc agcatcatga gcccacatct ctgtgtgtgt gtggtggtgt  
241 tctgctgggt atttattgtg tttatgcca tgttcacac actactcttg gctagattgt  
301 cattttgtaa gaacaatgtg atccacact tttctgtga catatctgcc cttctgaagt  
361 tggcatgctc tgatgtttat attaataat taatgatact tatcttgga gggtttctc  
421 ttgtcacctc actcttactc atcattgtat cctatgtaca aattgtctcc tcaatttaa  
481 ggatttctc tactcgggct atccataage tcttctccac ctgtggctca cacctgtctg  
541 tggctcact gttctatggg gcaattattg gtctgtactt atgtccatca gctaataact  
601 ctactgaaaa ggagactgcc atgtccctga tgtacacagt ggtgactccc (SEQ ID NO:407).

## OR242

LOCUS AF073978 648 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR4M olfactory receptor gene, partial

cds.  
ACCESSION AF073978  
KEYWORDS  
SOURCE western European house mouse.  
5 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 648)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
10 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 648)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
20 source 1..648  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR4M"  
25 mRNA <1..>648  
/product="olfactory receptor"  
CDS <1..>648  
/region="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
30 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACLTQMYFFSVFGSLE  
IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVVCVVFCWVFVIFYAMFHTLLRLSFC  
KNNVIPHFFCDISALLKLACSDVYINELMILILGGFLLVISLLLIIVSYVQIVSSILR  
ISSTRAIHKLFSTCGSHLSVVSIFYGTIIGLYLCPANNSTKETAMSLMYTVVTP" (SEQ ID  
35 NO:408).  
BASE COUNT 135 a 154 c 122 g 237 t  
ORIGIN  
1 cttctctgat ctctgctttt cctctgtcac aatgcccaag ttgctgcaga acatgcagat  
40 61 ccaggacaca cccatattct atgtggcttg tctgacacaa atgtactttt tcaagtgttt  
121 tgggagtcgt gagatatctc ttctgtagt cctggcctat gaccgctatg tggccatctg  
181 ttaccctt caatatcca gcatcatgag cccaatctc tgtgtgtgtg tgggtggtgt  
241 ctgctgggta ttattgtgt ttatgcat gtttcacaca ctactctgg ctgattgtc  
301 atttgtaag aacaatgtga tcccacactt ttctgtgac atatctgcc ttctgaagtt  
361 ggcatgctct gatgttata ttaatgaatt aatgatactt atctgggag gggtttctt  
45 421 tgtcatctca ctcttactca tcatgtatc ctatgtacaa attgtctcct caattttaag  
481 gattttctct acteggggta tccataagct cttctccacc tgggctcac acctgtctgt  
541 ggtctcactg ttctatggga caattattgg tctgtactta tgtccatcag ctaataactc  
601 tactgaaaag gagactgccca tgcctctgat gtacacagtg gtgactcc (SEQ ID NO:409).

## OR243

LOCUS AF073979 649 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR5M olfactory receptor gene, partial  
 cds.  
 5  
 ACCESSION AF073979  
 KEYWORDS .  
 SOURCE western European house mouse.  
 ORGANISM Mus musculus domesticus  
 10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 15 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 20 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 source 1..649  
 25 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR5M"  
 mRNA <1..>649  
 30 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 35 /translation="FSDLCFSSVTMPKLLQNMQSQDPSIPYASCLTQMYFFMAFGNME  
 IYLLVVMAYDRYVAICFPLHYTSIMSPKLCVSLVVLSWVFTILYSMLHTLLLARLSFC  
 EDNVIPHFFCDISALLKLACSDISINELMIFIVGGLDTPVIFLLIVVSYPVQIVCSILK  
 FSSTRGIHKVFSTCGSHLSVVSFLFYGTIIGVYICPSANNSTVKETVMSLMYTVVTP" (SEQ ID  
 NO:410).  
 40 BASE COUNT 135 a 171 c 124 g 219 t  
 ORIGIN  
 1 cttctctgat ctctgctttt cctctgtcac aatgcccaag ttgctgcaga acatgcagag  
 61 ccaggaccca tccatcccct atgccagctg tctgacacaa atgtactttt tcatggcttt  
 121 tgggaacatg gaaatttacc ttcttggtgt catggcctat gaccgctatg tggccatctg  
 45 181 cttccctctt cattacacca gcatcatgag ccctaagctc tgtgtgtctc tgggtgttct  
 241 ctcttgggta ttaccattc tgtattccat gtacacacc ctactcttgg caagattgtc  
 301 attctgtgag gacaatgtga tccccactt ttctgtgac atatctgcc tgctcaagtt  
 361 ggctgtctct gacatttcta ttaatgaact aatgatattt atcgtgggag ggcttgatac  
 421 tghtaatcca ttttactca ttgtgtttc ctatgtacaa attgtctgct ccatctaaa  
 50 481 gttctcatct acacggggca tacacaaggc cttctccacc tgtggctccc acctgtctgt  
 541 ggtctcactg ttctatggga caattattgg tgtctacata tgcccatcag ctaataactc  
 601 tactgtgaag gagactgtca tgcctctgat gtacacagtg gtgacgccc (SEQ ID NO:411).

# OR244

LOCUS AF073980 649 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR6M olfactory receptor gene, partial cds.

ACCESSION AF073980

KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France

FEATURES Location/Qualifiers

source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR6M"

mRNA <1..>649  
/product="olfactory receptor"

CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FTDLCFSSVTMPKLLQNMQSQVPSIPYAGCLTQMYFFLFFGDLE  
SFLLVAMAYDRYVAICFPLHYTSIMSPRLCVSLVLLSWLLTMSHSMHLTLLTRLSFC  
ENNVIPIHFFCDLSALLKLACSDIHINELVILIIGGLVVILPFLVTPYARISSILK  
VPSTRGIHKVFSTCGSHLSVVSIFYGTIIGLYLCPANNSTLKDTVMSLMYTVVTP" (SEQ ID

NO:412).

BASE COUNT 126 a 178 c 123 g 222 t

ORIGIN

1 cttcactgac ctctgctttt cctctgtcac aatgcccaag ttgtgcaga acatgcagag  
61 ccaagttcct tcaatcccct atgcaggctg cctgacacaa atgtacttct tttgtttt  
121 tggagatcct gagagcttcc tccttggtgc catggcctat gaccgatatg tagccatctg  
181 ctccctctt cattacacca gcattatgag cccaggctc tgtgtgagtc ttgtgtgct  
241 gtctgtgtg ctgacatgt cccattccat gctgcacact ttgtcttaa ctagggtgtc  
301 tttctgtgaa aacaatgtga tccccattt tttctgtgat ctgtctgctc tgcagaagct  
361 ggctgtctct gatattcaca ttaatgaatt ggtgatattg atcataggag ggctgtgtg  
421 tatacttcca ttctactcg tcacagtgc ttatgcacgc atcatctctt ccattctcaa  
481 ggtcccttca actcgaggca tccacaaggc ctctccact tgtggtctc acctgtctgt  
541 ggtgtcactg ttctatggga caattattgg cctctactta tgcctatctg ctaataactc



601 tactctaaag gacactgtca tgtctctgat gtacactgtg gtaactccc (SEQ ID NO:413).

## OR245

5 LOCUS AF073981 649 bp DNA ROD 12-JUL-1999  
DEFINITION Mus musculus domesticus clone OR7M olfactory receptor gene, partial  
cds.  
ACCESSION AF073981  
KEYWORDS .  
10 SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
15 REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
20 REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
25 FEATURES Location/Qualifiers  
source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
30 /clone="OR7M"  
mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
35 /codon\_start=2  
/product="olfactory receptor"  
/translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
SLLLVAMAYDRYVAICFPLHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLLTRL SFC  
KNNVIPHFFCDLSALLKLACSDIHINELMIMIIGALVVILPFLLIIVSYAHIVSSILK  
40 VPSTRGIHKVFSTCGSHLSAVSLFYGSVIVLYLCPSSNNSTVKDTVMSMMYTVVTP" (SEQ ID  
NO:414).  
BASE COUNT 136 a 165 c 117 g 231 t  
ORIGIN  
1 cttcactgac ctctgctttt ctactgtcac aatgcccaat ttctgcaaa acatgcagag  
45 61 ccaagtatca tccattccct atgcaggctg ccttgcaaa atgtacttct tttgtttt  
121 tggatgatgt gagagcttac tcttgttgcc catggcctat gaccgttatg tggccatctg  
181 cttccctctt cattatacca gaatcatgag cccaaacctc tgtgtgagta tgggtgctgt  
241 gtcttgggca ctgacaacat tgtatgcat gtgcacact ttgtcttaa ctagggtgtc  
301 ttctgtaaa aacaatgtga tccccattt ttctgtgac cttctgtctc tctgaagct  
50 361 ggctgtctct gatattcaca ttaatgagtt aatgataatg ataattggag cactgtgtgt  
421 tatacttcca ttctactca tcatagtgtc ttatgcgcac attgtctcct ccattctcaa  
481 agtcccctca actcgaggca tccacaaggt cttctccact tgtggtctc atctgtctgc

541 ggtgtcactg ttctatgggt cagtcattgt tctgtactta tgtccatcat ctaataactc  
601 tactgtgaag gatactgtca tgtctatgat gtacactgtg gtgactccc (SEQ ID NO:415).

## OR246

LOCUS AF073982 649 bp DNA ROD 12-JUL-1999  
DEFINITION Mus musculus domesticus clone OR8M olfactory receptor gene, partial  
cds.  
ACCESSION AF073982  
KEYWORDS .  
SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR8M"  
mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNIQSQDPSIPYAGCLAQTYFFMVFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKLCGCLMLLLWMLTTSHAMMHTLLAARLSFC  
ENNVILNFFCDLFVLLKLACSDTYVNELMIFIMSSLLIVIPFFLIVMSYARIIASILK  
VPSIQGIYKVFSTCGSHLSVVTIFYGTIIGLYLCPSGNNSTVKGTVMAMMYTAVTP" (SEQ ID  
NO:416).  
BASE COUNT 143 a 162 c 123 g 221 t  
ORIGIN

1 ctctctgat ctctgcttt cctctgtcac aatgccc aaa ttgctgcaga atatacagag  
61 ccaggaccca tccatcccct atgcaggctg cctggcaca acatactctt ttatggttt  
121 tggagatag gagagcttc ttctgtggc catggcctat gaccgctatg tggccatctg  
181 ctccctctg cattacacca gcatcatgag tcccaaactc tgtggtgtc taatgctgt  
241 attgtgatg ctaacaacat cccatgccat gatgcatact ctcttgcag caagattgtc  
301 ttttgtgag aacaatgtga tcctcaattt ttctgtgac ctattgtac tcctaaagct  
361 ggcttgctca gacacttatg ttaatgagtt gatgatattt ataataagtt ccctcctcat  
421 tgtattcca ttttctca ttgtcatgtc ttatgcaagg atcattgcct ccattcttaa

481 ggttccatct attcaaggga tctacaaggt cttctccacc tgtggtccc atctgtctgt  
 541 ggtgaccttg tttatggga caattattgg tctctactta tgccatcag gtaataatc  
 601 cacagtaaag gggactgtca tggccatgat gtacacagcg gtgactccc (SEQ ID NO:417).

# 5            **OR247**

LOCUS    AF073983    649 bp    DNA            ROD    12-JUL-1999

DEFINITION    Mus musculus domesticus clone OR912-47M4 olfactory receptor gene,  
 partial cds.

10    **ACCESSION**    AF073983

**KEYWORDS**    .

**SOURCE**    western European house mouse.

**ORGANISM**    Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

15    Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

**REFERENCE**    1 (bases 1 to 649)

**AUTHORS**    Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

**TITLE**    Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional

20    **JOURNAL**    Unpublished

**REFERENCE**    2 (bases 1 to 649)

**AUTHORS**    Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

**TITLE**    Direct Submission

**JOURNAL**    Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS

25    UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

**FEATURES**            Location/Qualifiers

**source**            1..649

/organism="Mus musculus domesticus"

30    /sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR912-47M4"

**mRNA**            <1..>649

/product="olfactory receptor"

35    **CDS**            <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="FVDICFTSTTVPKMLVNIQTQSKAITYADCISQMSVFLVFAELD

40    NFLAVMAYDRYVAICHPLYTVIVNQHLCLMVLLSWVVSILHAFLQSSIVLQLTFC

GDVKIPHFCELNQLSQLTCSDFSSQLIMNLVPVLLAVISFSSILYSYFKIVSSICS

ISSVQGKYKAFSTCVSHLSIVSLFYSTGLGVYVSSVVIQSSHAARASVMYTVVTP" (SEQ ID

NO:418).

**BASE COUNT**    148 a    157 c    118 g    226 t

45    **ORIGIN**

1 ctttgtggac atctgtttta cctccaccac tgtcccaaag atgctggtaa atatacagac

61 tcaaagcaag gccattacat atgcagactg tattagccag atgtctgtct tcttggtttt

121 tgcagaattg gacaacttc tcctggctgt gatggcctat gaccgatatg tggctatctg

181 tcaccatta tattacacag tcattgttaa ccaacatctc tgtatactga tggttctgct

241 gtctctgggt gtagcatcc tacatgcctt ctacagagc tcaattgtgc tacagttgac

301 ctttgtgga gatgtaaaaa ttcccactt cttctgtgag ctaaccagc tgtctcaact

361 cacatgttca gacagctttt caagccaact cataatgaat cttgtacctg ttctattggc

421 agtcatttcc ttacagtagta tcctttactc ttatttcaag atagtgtcct ccatatgttc  
 481 tatctcctca gtccaaggga agtacaaggc attttctaca tgtgtctctc acctttccat  
 541 tgtctcctta ttttatagta caggccttgg agtgtatgtc agttctgttg tgatccaaag  
 601 ctctcactct gctgcaagag cctctgtgat gtatactgtg gtcaccccg (SEQ ID NO:419).

5

## OR248

LOCUS AF073984 646 bp DNA ROD 12-JUL-1999

DEFINITION Mus musculus domesticus clone OR912-47M6 olfactory receptor gene,  
 partial cds.

ACCESSION AF073984

KEYWORDS .

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 646)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 646)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

FEATURES Location/Qualifiers

source 1..646

/organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR912-47M6"

mRNA <1..>646

/product="olfactory receptor"

CDS <1..>646

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="SVDVCFSSSTTVPKVLAIHILRNQAISFSGCLTQLYFLCVFADMD  
 NFLAVMAYDRFVAICHPLHYTTKMTHQLCAFLVVGSWMVASLNALLHTLLVAQLYFC  
 GDNVIPHFFCEVTPLLKLSCSDTHLNEMLAVAGLIMLAPFVCILLSYILIACAILK  
 ISSTGRWKAFSTCGSHLAVVCLFYGTIISLYFNPSSSHSAGRDMAAAMMYTVVTP" (SEQ ID

NO:420).

BASE COUNT 128 a 178 c 133 g 207 t

ORIGIN

1 ctctgtggat gtatgcttct cctccaccac tgtccctaag gtactggcca ttcacatact  
 61 aagaaatcaa gccatttctg tctctgggtg cctcacacag ctgtattttc tctgtgtgtt  
 121 tgctgacatg gacaatttcc tgctggctgt gatggcctat gaccgatttg tggccatatg  
 181 ccacccttta cactacacaa caaagatgac ccatcagctt tgtgcctttc ttgtgtgttg  
 241 gtctctggatg gtaccagtc tgaatgctct gttgcacaca ctgctcgttg ctcaactcta  
 301 cttctgtggg gacaatgtga tccccactt cttctgtgaa gtgactcccc tgctgaaact

361 ctcttgctca gacacacatc tcaatgagtt gatgattctt gctgttcag ggctgataat  
 421 gttagctcca ttgtttgca tctcttctt ttatccctt attgcttggt ccatcctgaa  
 481 aatctcatcc acaggaagat ggaaagcctt ctctacctgt ggctcacact tggctgttgt  
 541 gtgcctcttc tatggcacta tcataccct gtattcaac cctcatctt ctactcagc  
 5 601 tgggaggac atggcagctg ccatgatgta cacagtgggtg accccc (SEQ ID NO:421).

## OR249

LOCUS AF073985 650 bp DNA ROD 12-JUL-1999  
 10 DEFINITION Mus musculus domesticus clone OR912-47M7 olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073985  
 KEYWORDS  
 SOURCE western European house mouse.  
 15 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 650)  
 20 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 650)  
 25 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 30 FEATURES Location/Qualifiers  
 source 1..650  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR912-47M7"  
 35 mRNA <1..>650  
 /product="olfactory receptor"  
 CDS <1..>650  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 40 /product="olfactory receptor"  
 /translation="FVDICFTSTTVPKMLVNIQTQSKAITYADCISQMSVFLVFGELD  
 NFLAVMAYDRYVAICHPLYTFFIVNQHLCLMVLLSWVVSILHAFLOQSSIVLQLTFC  
 GDVRIPHFFCELNQLSQLTCSDSLSSHLIMHLVPVLLGAISFSSILYSYFKIVSSICS  
 ISSVQGGKYKAFSTCVSHLSIVSLFYSTGLGVYVSSAVVQSSHAARASVMYTVVTH" (SEQ ID  
 45 NO:422).  
 BASE COUNT 148 a 159 c 121 g 222 t  
 ORIGIN  
 1 ctttgggac atctgttca cctccaccac tgtcccaaag atgctggtaa atatacagac  
 61 tcaaagcaag gccattacat atgcagactg tattagccag atgtctgtct tcttggttt  
 50 121 tggagaactg gacaacttc tcttggtgt gatggcctat gaccgatatg tggctatctg  
 181 tcaccatg tattacacat tcattgttaa ccaacatctc tgtatactga tggttctgct  
 241 gtctggggt gttagcatcc tacatgcctt cttacagagc tcaattgtac tacagttgac

301 ctttgtgga gatgaagaa ttccccactt cttctgtgag ctaaccagc tgtctcaact  
 361 cacatgttca gacagcttat caagccacct cataatgcat cttgtacctg ttctattggg  
 421 agccatttcc ttcagtagta tcttttactc ttatttcaag atagtgtcct ccatatgttc  
 481 tatctctca gttcaaggga agtacaaggc attttctaca tgtgtctctc accttccat  
 541 tgtatcctta ttttatagta caggccttgg agtgtatgtc agttctgctg tggccaaag  
 601 ctctcactct gctgcaagag cctctgtgat gtatactgtg gtcacacacg (SEQ ID NO:423).

## OR250

LOCUS AF073986 649 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR912-47M8 olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073986  
 KEYWORDS .  
 SOURCE western European house mouse.  
 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR912-47M8"  
 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFTSTTVPKVLVNIQTQSKAITYADCISQMSVFLVFAELD  
 NFLAVMAYDRYVAICHPLYTYTFIVNQHLCLMVLLSWVVSILHAFLQSSIVLQLTFC  
 GDVKIPHFFCELNQLSQLTCLDSFSSHLIMNLVPVLLAVISFSSILYSYFKIVSSICS  
 ISSVQKGKYKAFSTCVSHLSIVFLFYSTGLGVYVSSAVVQSSHAARASVMYTVVTP" (SEQ ID  
 NO:424).  
 BASE COUNT 144 a 159 c 120 g 226 t  
 ORIGIN  
 1 ctttgtggac atctgtttca cctccaccac tgtcccaaag gtgctggtaa atatacagac  
 61 tcaaagcaag gccattacat atgcagactg tattagccag atgtctgtct tcttggtttt  
 121 tgcagaattg gacaacttc tcttggtgt gatggcctat gaccgatatg tggctatctg  
 181 tcaccattg tattacacat ctattgttaa ccaacatctc gtatactga tggttctgct

241 gtctgggt gtagcatcc tacatgcctt cttacagagc tcaattgtgc tacagttgac  
 301 cttttgtga gatgtaaaaa tccccactt cttctgcgag cttaccagc tgtctcaact  
 361 cacatgttta gacagctttt caagccacct cataatgaat cttgtacctg ttctattggc  
 421 agtcatttcc ttcagtagta tcctttactc ttatttcaag atagtgtcct ccatatgttc  
 481 tatctctca gttcaaggga agtacaaggc attttctaca tgtgtctctc accttccat  
 541 tgtctctta tttatagta caggccttgg agtgtatgtc agttctgctg tggccaaag  
 601 ctctactct gctgcaagag cctctgtgat gtatactgtg gtcaccccg (SEQ ID NO:425).

## OR251

LOCUS AF073987 649 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR912-47M9 olfactory receptor gene,  
 partial cds.  
 ACCESSION AF073987  
 KEYWORDS .  
 SOURCE western European house mouse.  
 ORGANISM Mus musculus domesticus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
 UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France  
 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Mus musculus domesticus"  
 /sub\_species="domesticus"  
 /db\_xref="taxon:10092"  
 /clone="OR912-47M9"  
 mRNA <1..>649  
 /product="olfactory receptor"  
 CDS <1..>649  
 /note="region between transmembrane domains TM2 and TM7."  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FADLCFSTTTVPQVLVHFLVKRKTISFAGCSTQIVVLLLVGCTE  
 CALLAVMSYDRYVAVCKPLHYSTIMTHWLCVQLAAGSWASGALVSLVDTTFTLRLPYR  
 GNNVINHHFCEPPALLKLASADTYSTEMAIFAMGVVILLAPVSLILTSYWNIISTVIQ  
 MQSGEGRCLKVFSTCGSHLIVVLFYGSAIFAYMRPNSKIMNEKDKMISVFYSAVTP" (SEQ ID  
 NO:426).  
 BASE COUNT 141 a 175 c 146 g 187 t  
 ORIGIN  
 1 ctttgcagat ctctgctttt ctactaccac agtgccccag gtgcttgcc acttctgtgt  
 61 gaagaggaag accatttctt ttgctggatg ttctacacag atagtgggtg tgcttctgtg  
 121 cggatgcaca gagtgtgcac tgctggcagt gatgtcctat gaccgatatg tggctgtctg

181 caaacctctg cactactcca ccatcatgac acactggcta tgtgttcagc tggctgcagg  
 241 gtcttgggcc agtgggtcac ttgtgtcct ggtggatacc acattcacat tacgtcttcc  
 301 ttatcgagga aacaatgtca ttaaccactt ttctgtgaa cctctgccc tctgaagct  
 361 ggcacgggca gatacatata gcacagagat ggcgactttt gcaatgggtg tggtaatcct  
 421 cctagcacct gtctccctca tctcacctc ctactggaac atcatctcca ctgtaatcca  
 481 gatgcagtct ggggaaggaa ggctcaaggt cttctccacc tgtggctccc acctcattgt  
 541 tgtgttctc ttctacggct cagcaatatt tgcctacatg aggcccaact ctaagataat  
 601 gaatgaaaag gataaaatga ttccggtgtt ctattcagca gtgaccccg (SEQ ID NO:427).

## OR252

LOCUS AF073988 649 bp DNA ROD 12-JUL-1999  
 DEFINITION Mus musculus domesticus clone OR9M olfactory receptor gene, partial  
 cds.

ACCESSION AF073988

KEYWORDS

SOURCE western European house mouse.

ORGANISM Mus musculus domesticus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
 potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS

UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
 France

FEATURES Location/Qualifiers

source 1..649

/organism="Mus musculus domesticus"

/sub\_species="domesticus"

/db\_xref="taxon:10092"

/clone="OR9M"

mRNA <1..>649

/product="olfactory receptor"

CDS <1..>649

/note="region between transmembrane domains TM2 and TM7."

/codon\_start=2

/product="olfactory receptor"

/translation="FTDLCFSSVTMPKLLQNMQSQVPSIPYAGCLTQMYFFLFFGDLE

SFLLVAMAYDRYVAICFPLHYTSIMSPRLCVSLVLLSWLLTMSHSMHLTLLTRLSFC

ENNVIPIHFFCDLSALLKLACSDIHINELVILIIGGLVVILPFLLVTVSYARIISILK

VPSTRGIHKVFSTCGSHLSVVSIFYGTIIGLYLCPANNSTLKDVTMSLMYTVVTP" (SEQ ID

NO:428).

BASE COUNT 126 a 177 c 123 g 223 t

ORIGIN

1 cttcactgac ctctgctttt cctctgtcac aatgcccaag ttgctgcaga acatgcagag

61 ccaagttcct tcaatccct atgcaggctg cctgacacaa atgtacttct tttgtttt



09747155.123100

121 tggagatctt gagagcttcc tcctgtggc catggcctat gaccgatatg tagccatctg  
181 ctccctctt cattacacca gcattatgag ccccaggctc tgtgtgagtc ttgtgtgtgt  
241 gtccctgggtg ctgacctatg cccattccat gctgcacact ttgtcttaa ctaggtgtc  
301 ttctgtgaa aacaatgtga tccccattt ttctgtgat ctgtctgctc tgctgaagct  
361 ggctgtctct gatattcaca ttaatgaatt ggtgatattg atcataggag ggctgttgt  
421 tatactcca ttctactcg tcacagtgc ttatgcacgc atcatctctt ccatttcaa  
481 ggcccttca actcaggga tccacaaggt ctctccact tgtgttctc acctgtctgt  
541 ggtgtcactg ttctatggga caattattgg cctctactta tgtccatctg ctaataactc  
601 tactctaaag gacactgtca tgtctctgat gtacactgtg gtaactccc (SEQ ID NO:429).

## OR253

LOCUS AF073989 1865 bp DNA ROD 12-JUL-1999  
DEFINITION Mus musculus clone OR1-72M13 olfactory receptor gene, complete cds.

ACCESSION AF073989

KEYWORDS

SOURCE house mouse.

ORGANISM Mus musculus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.

REFERENCE 1 (bases 1 to 1865)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 1865)

AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.

TITLE Direct Submission

JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS

UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,

France

FEATURES Location/Qualifiers

source 1..1865

/organism="Mus musculus"

/db\_xref="taxon:10090"

/clone="OR1-72M13"

/cell\_line="NIH3T3"

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/product="olfactory receptor"

CDS 547..1482

/note="orthologous to human gene OR1-72"

/codon\_start=1

/product="olfactory receptor"

/translation="MKPENQTKYFRIFASGVFQYPEHQPMLFGLFLLMFVVAVLGNLL

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LLMLRLSFCTNQIHKHFYCEYAKALTIACSDTLINHILLYIVIWVLGFIPIFSGILYSY

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MYTVVTPMLNPFIYSLRNKDIKKALKTLGRILLK" (SEQ ID NO:430).

BASE COUNT 568 a 355 c 321 g 621 t

ORIGIN

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 241 gttggaaatc agagttgatc catcataaag gattacagca cttttagaaa ctgactgctt  
 301 tgatctaaca ctccagagg ttatctggct tcatgtggt taaaatttg tagagttagc  
 361 agttctaagt agagataagg tagagaaact aataatgatg agaaaatgca ggattcctaa  
 421 tttttattgt aataaaagct ttatgtacag ttattccaac acataaaagg acagagacct  
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 1801 catgtatata tatataacac tgttggtggt tggccgact ctgtattctg atattaattc  
 1861 tgcag (SEQ ID NO:431).

As used herein, the terms “ORX nucleic acid sequence” and/or “ORX nucleic acid molecule” specifically refer to the sequences of GenBank Accession Nos. AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

Likewise, the term “ORX polypeptide” specifically refers to the polypeptide sequences of GenBank Accession Nos. AF127814, AF127816-127819, AF127821-127824, AF127836-127837, AF127840, AF127845-127848, AF127851-127852, AF127857, AF127859, AF127861-127862, AF127865, AF127867-127868, AF127870-127872, AF127874-127884, AF127886, AF127888, AF127896-127904, AF127906-127907, AF179716-179717, AF179720-179728, AF179730-179737, AF179739-179746, AF179748-179750, AF179752, AF179755-179756, AF179758-179761, AF179766-179767, AF179770-179771, AF179773-179775, AF179777-179779, AF179784-179788, AF179790-179792, AF179794, AF179796-179799, AF179802-

179811, AF179814, AF179816-179818, AF179820, AF179822-179832, AF179834-179839, AF179841-179843, and AF073959-073989.

To sample the ORX genes in primate species, ORX genes were randomly sequenced from anthropoids and prosimians (See FIG. 1). As outlined in Examples 1-3, *infra*, ORX genes were obtained by PCR on genomic DNA from the different species using consensus ORX primer pairs OR5B-OR3B and OR3.1-OR7.1 chosen respectively in the transmembrane domains TM2 and TM7, and TM3 and TM7. Except for humans, eighteen to thirty-five individual ORX clones were sequenced per taxon. A total of 221 ORX sequences, representing ten species, was analyzed. These sequences are distributed in different groups whose percentage of nucleotide sequence identity (NSI) ranges from ~35 to >99%. The corresponding amino acid sequences were compared to a variety of ORX sequences from the public databases and previous studies. See Rouquier et al., (1998) *Nature Genet.* 18, 243-50.

All sequences have the characteristic features of olfactory receptors, with a heptahelical structure and conserved motifs as previously defined. See Buck et al., (1991) *Cell* 65, 175-187; Rouquier et al., (1998) *Nature Genet.* 18, 243-50; and Rouquier et al., (1998) *Hum. Mol. Genet.* 7, 1337-45. The use of two pairs of consensus primers made the sampling representative of the ORX gene repertoire. Primate sequences are distributed in seven families (sequences that share >40% amino-acid identity (ASI) define a family), and 56 subfamilies (sequences that share >60% ASI define a subfamily). Group 1-II of family 1 represents the zone of overlap of sequences derived from using the two primer pairs (See FIG. 2).

Non-human primate ORX genes are represented in 6 families and about 45 subfamilies. Numerous sequences are grouped in family 1 (~66%) comprising subfamily 1A, the largest subfamily (57/221, 26%). Subfamily 1B is almost devoid of coding human ORX sequences (FIG. 2). Subfamily 1A contains only human pseudogenes originating from chromosomes 14 and 19 whereas subfamily 1B contains human pseudogenes lying on various chromosomes. As has been previously found for human, the amino-acid sequences deduced from the non-human primate sequences revealed many pseudogenes (FIG. 2 and Table 1).

Table 1 provides information about the evolution of the pseudogene fraction along with the evolution of primates. Hominoids present the highest fraction of pseudogenes (39 to >70%, average ~50%). Old world monkeys (macaque and baboon) have a lower pseudogene fraction

(20 to 35%, average 27%), while even fewer pseudogenes were found among the sequences derived from new world monkeys. Only one pseudogene (SBO64) was identified among the 49 sequences obtained from marmoset and two species of squirrel-monkey. In contrast, 37% of the prosimian lemur ORX sequences were pseudogenes.

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**TABLE 1**

Species						
	Common name		Number of sequences analyzed	% ORF	% pseudogenes	Average % pseudogenes
Hominoids	Human	Homo sapiens (HSA)	99	30	70	50 %
	Chimpanzee	Pan troglodytes (PTR)	21	52	48	
	Gorilla	Gorilla gorilla (GGO)	18	50	50	
	Orangutan	Pongo pygmaeus (PPY)	23	61	39	
	Gibbon	Hylobates lar (HLA)	22	59	41	
Old world monkeys	Macaque	Macaca sylvanus (MSY)	20	65	35	27 %
	Baboon	Papio papio (PPA)	21	81	19	
New world monkeys	Marmoset	Callithrix jacchus (CJA)	19	100	0	2 %
	Squirrel-monkey	Saimiri sciurus (SSC)	15	100	0	
		Saimiri boliviensis (SBO)	15	93	7	

Prosimians	Lemur	Eulemur fulvus (EFU)	19	58	42	37 %
		Eulemur rubriventer (ERU)	16	69	31	
Rodents	Mouse	Mus musculus (MMU)	33	100	0	0 %
Fish	Zebrafish	Danio rerio (DRE)	3	100	0	0 %

Diverse reasons have been suggested that could account for the differences in olfactory ability among mammals, *i.e.*, the size of the anatomical structures devoted to olfaction (olfactory epithelium, olfactory bulb, cortical structures), or the number of ORX families/subfamilies, and the total number and diversity of expressed ORX genes. The olfactory epithelial surface of macrosmatic animals, such as dogs, is larger than in microsmatic humans. On the other hand, using unique dog sequence probes that represent specific ORX subfamilies and which will not cross-hybridize with other subfamilies, comparative analyses have been performed by Southern blot analysis among a panel of mammals including dog and human. The number of ORX sequences per subfamily is similar in microsmatic and macrosmatic animals. A high fraction (>70%) of the human ORX genes have been mutated during evolution into pseudogenes. Chromosomes 7, 16 or 17 contained a high fraction of potentially coding ORX sequences, whereas other chromosomes such as chromosome 3 or 11 contained primarily pseudogenes. Other studies on chromosome 17 and on chromosome 11 in which 75% of the ORX sequences identified were pseudogenes, support these observations.

All ORX sequences derived from mouse are potentially coding. No pseudogenes were detected either by sequencing randomly selected ORX sequences or by deliberately screening with human ORX pseudogene probes. This indicates that the ORX pseudogene content is either zero or restricted to rare examples in mouse.

Thus, the reduction of the sense of smell could correlate with the fraction of functional ORX genes in the genome.

It is difficult to measure and compare the olfactory efficiency of different animal species. Various parameters such as the threshold of detection of odorants (sensitivity), the range of odors detectable and the discriminatory power (acuity) are key parts of the olfactory ability. Thus it is uncertain to determine precisely which of these parameters are taken in account when comparing two species, and therefore the origin of the olfactory deficiency of primates remains a controversial and difficult point to address.

The chromosomal distribution of the ORX gene repertoire arose through multiple duplication rounds giving rise to paralogous regions. Even though the number of duplication events may be different among the mammals, overall it appears that the number of ORX genes was established before the divergence of mammals. *See Ben-Arie et al., (1994) Hum. Mol.*

Genet. 3, 229-35. This explains why, by Southern analysis, there is no striking difference in the number of ORX genes of four different subfamilies between the sea lion, which has an underdeveloped olfactory apparatus, and other mammals. *See id.* On the other hand, the Southern blot approach does not reveal the functionality of the ORX sequences, and we predict that a large fraction of the sea lion ORX genes could be pseudogenes as has been described for the dolphin. *See Sharon et al., (1999) Genomics, 61, 24-36.* Similarly striking differences have been observed in the olfactory ability of different breeds of dogs. *See Issel-Tarver et al., (1996) Proc. Natl. Acad. Sci. USA 93, 10897-902.* Despite the variations in the size of the olfactory epithelium of the different breeds, it would be interesting to know what the biological basis is for the differences in performances observed between sight and scent hounds. One obvious possibility is loss of functional ORX genes, but, given the recent origin of all modern dogs this explanation seems unlikely. Other explanations could be changes in behavior, or in expression brought about by the modification of a key master transcription factor or in the unusual mechanism that allows only one ORX gene allele or the other to be expressed exclusively in any one epithelium cell.

#### ORX Nucleic Acids

The nucleic acids of the invention include those that encode an ORX polypeptide or protein. As used herein, the terms polypeptide and protein are interchangeable.

In some embodiments, an ORX nucleic acid encodes a mature ORX polypeptide. As used herein, a "mature" form of a polypeptide or protein described herein relates to the product of a naturally occurring polypeptide or precursor form or proprotein. The naturally occurring polypeptide, precursor or proprotein includes, by way of nonlimiting example, the full-length gene product, encoded by the corresponding gene. Alternatively, it may be defined as the polypeptide, precursor or proprotein encoded by an open reading frame described herein. The product "mature" form arises, again by way of nonlimiting example, as a result of one or more naturally occurring processing steps that may take place within the cell in which the gene product arises. Examples of such processing steps leading to a "mature" form of a polypeptide or protein include the cleavage of the N-terminal methionine residue encoded by the initiation codon of an open reading frame, or the proteolytic cleavage of a signal peptide or leader sequence. Thus a



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mature form arising from a precursor polypeptide or protein that has residues 1 to N, where residue 1 is the N-terminal methionine, would have residues 2 through N remaining after removal of the N-terminal methionine. Alternatively, a mature form arising from a precursor polypeptide or protein having residues 1 to N, in which an N-terminal signal sequence from residue 1 to residue M is cleaved, would have the residues from residue M+1 to residue N remaining. Further as used herein, a “mature” form of a polypeptide or protein may arise from a step of post-translational modification other than a proteolytic cleavage event. Such additional processes include, by way of non-limiting example, glycosylation, myristoylation or phosphorylation. In general, a mature polypeptide or protein may result from the operation of only one of these processes, or a combination of any of them.

Among the ORX nucleic acids is the nucleic acid whose sequence is provided by GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a fragment thereof. Additionally, the invention includes mutant or variant nucleic acids of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a fragment thereof, any of whose bases may be changed from the corresponding bases shown in the ORX nucleic acids, while still encoding a protein that maintains at least one of its ORX-like activities and physiological functions (*i.e.*, modulating angiogenesis, neuronal development). The invention further includes the complement of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, including fragments, derivatives, analogs and homologs thereof. The invention additionally includes nucleic acids or nucleic acid fragments, or complements thereto, whose structures include chemical modifications.

One aspect of the invention pertains to isolated nucleic acid molecules that encode ORX proteins or biologically active portions thereof. Also included are nucleic acid fragments sufficient for use as hybridization probes to identify ORX-encoding nucleic acids (*e.g.*, ORX mRNA) and fragments for use as polymerase chain reaction (PCR) primers for the amplification or mutation of ORX nucleic acid molecules. As used herein, the term “nucleic acid molecule” is intended to include DNA molecules (*e.g.*, cDNA or genomic DNA), RNA molecules (*e.g.*, mRNA), analogs of the DNA or RNA generated using nucleotide analogs, and derivatives,

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fragments and homologs thereof. The nucleic acid molecule can be single-stranded or double-stranded, but preferably is double-stranded DNA.

5 "Probes" refer to nucleic acid sequences of variable length, preferably between at least about 10 nucleotides (nt), 100 nt, or as many as about, *e.g.*, 6,000 nt, depending on use. Probes are used in the detection of identical, similar, or complementary nucleic acid sequences. Longer length probes are usually obtained from a natural or recombinant source, are highly specific and much slower to hybridize than oligomers. Probes may be single- or double-stranded and designed to have specificity in PCR, membrane-based hybridization technologies, or ELISA-like technologies.

10 An "isolated" nucleic acid molecule is one that is separated from other nucleic acid molecules that are present in the natural source of the nucleic acid. Examples of isolated nucleic acid molecules include, but are not limited to, recombinant DNA molecules contained in a vector, recombinant DNA molecules maintained in a heterologous host cell, partially or substantially purified nucleic acid molecules, and synthetic DNA or RNA molecules. Preferably,  
15 an "isolated" nucleic acid is free of sequences which naturally flank the nucleic acid (*i.e.*, sequences located at the 5' and 3' ends of the nucleic acid) in the genomic DNA of the organism from which the nucleic acid is derived. For example, in various embodiments, the isolated ORX nucleic acid molecule can contain less than about 50 kb, 25 kb, 5 kb, 4 kb, 3 kb, 2 kb, 1 kb, 0.5 kb or 0.1 kb of nucleotide sequences which naturally flank the nucleic acid molecule in genomic  
20 DNA of the cell from which the nucleic acid is derived. Moreover, an "isolated" nucleic acid molecule, such as a cDNA molecule, can be substantially free of other cellular material or culture medium when produced by recombinant techniques, or of chemical precursors or other chemicals when chemically synthesized.

25 A nucleic acid molecule of the present invention, *e.g.*, a nucleic acid molecule having the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a complement of any of these nucleotide sequences, can be isolated using standard molecular biology techniques and the sequence information provided herein. Using all or a portion of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843,  
30 as a hybridization probe, ORX nucleic acid sequences can be isolated using standard

hybridization and cloning techniques (*e.g.*, as described in Sambrook *et al.*, eds., MOLECULAR CLONING: A LABORATORY MANUAL 2<sup>nd</sup> Ed., Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989; and Ausubel, *et al.*, eds., CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, New York, NY, 1993.)

5 A nucleic acid of the invention can be amplified using cDNA, mRNA or alternatively, genomic DNA, as a template and appropriate oligonucleotide primers according to standard PCR amplification techniques. The nucleic acid so amplified can be cloned into an appropriate vector and characterized by DNA sequence analysis. Furthermore, oligonucleotides corresponding to ORX nucleotide sequences can be prepared by standard synthetic techniques, *e.g.*, using an  
10 automated DNA synthesizer.

As used herein, the term "oligonucleotide" refers to a series of linked nucleotide residues, which oligonucleotide has a sufficient number of nucleotide bases to be used in a PCR reaction. A short oligonucleotide sequence may be based on, or designed from, a genomic or cDNA  
15 sequence and is used to amplify, confirm, or reveal the presence of an identical, similar or complementary DNA or RNA in a particular cell or tissue. Oligonucleotides comprise portions of a nucleic acid sequence having about 10 nt, 50 nt, or 100 nt in length, preferably about 15 nt to 30 nt in length. In one embodiment, an oligonucleotide comprising a nucleic acid molecule less than 100 nt in length would further comprise at least 6 contiguous nucleotides of GenBank  
20 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a complement thereof. Oligonucleotides may be chemically synthesized and may be used as probes.

In another embodiment, an isolated nucleic acid molecule of the invention comprises a nucleic acid molecule that is a complement of the nucleotide sequences shown in GenBank  
25 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a portion of this nucleotide sequence. A nucleic acid molecule that is complementary to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 is one that is sufficiently complementary to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 that it can hydrogen bond with little or no

mismatches to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, thereby forming a stable duplex.

As used herein, the term "complementary" refers to Watson-Crick or Hoogsteen base pairing between nucleotide units of a nucleic acid molecule, and the term "binding" means the physical or chemical interaction between two polypeptides or compounds or associated polypeptides or compounds or combinations thereof. Binding includes ionic, non-ionic, Von der Waals, hydrophobic interactions, etc. A physical interaction can be either direct or indirect. Indirect interactions may be through or due to the effects of another polypeptide or compound. Direct binding refers to interactions that do not take place through, or due to, the effect of another polypeptide or compound, but instead are without other substantial chemical intermediates.

Moreover, the nucleic acid molecule of the invention can comprise only a portion of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, *e.g.*, a fragment that can be used as a probe or primer, or a fragment encoding a biologically active portion of ORX. Fragments provided herein are defined as sequences of at least 6 (contiguous) nucleic acids or at least 4 (contiguous) amino acids, a length sufficient to allow for specific hybridization in the case of nucleic acids or for specific recognition of an epitope in the case of amino acids, respectively, and are at most some portion less than a full length sequence. Fragments may be derived from any contiguous portion of a nucleic acid or amino acid sequence of choice. Derivatives are nucleic acid sequences or amino acid sequences formed from the native compounds either directly or by modification or partial substitution. Analogs are nucleic acid sequences or amino acid sequences that have a structure similar to, but not identical to, the native compound but differs from it in respect to certain components or side chains. Analogs may be synthetic or from a different evolutionary origin and may have a similar or opposite metabolic activity compared to wild type.

Derivatives and analogs may be full length or other than full length, if the derivative or analog contains a modified nucleic acid or amino acid, as described below. Derivatives or analogs of the nucleic acids or proteins of the invention include, but are not limited to, molecules comprising regions that are substantially homologous to the nucleic acids or proteins of the invention, in various embodiments, by at least about 70%, 80%, 85%, 90%, 95%, 98%, or even 99% identity (with a preferred identity of 80-99%) over a nucleic acid or amino acid sequence of

identical size or when compared to an aligned sequence in which the alignment is done by a computer homology program known in the art, or whose encoding nucleic acid is capable of hybridizing to the complement of a sequence encoding the aforementioned proteins under stringent, moderately stringent, or low stringent conditions. See *e.g.* Ausubel, *et al.*, CURRENT  
5 PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, New York, NY, 1993, and below. An exemplary program is the Gap program (Wisconsin Sequence Analysis Package, Version 8 for UNIX, Genetics Computer Group, University Research Park, Madison, WI) using the default settings, which uses the algorithm of Smith and Waterman (Adv. Appl. Math., 1981, 2: 482-489, which is incorporated herein by reference in its entirety).

10 A "homologous nucleic acid sequence" or "homologous amino acid sequence," or variations thereof, refer to sequences characterized by a homology at the nucleotide level or amino acid level as discussed above. Homologous nucleotide sequences encode those sequences coding for isoforms of an ORX polypeptide. Isoforms can be expressed in different tissues of the same organism as a result of, for example, alternative splicing of RNA. Alternatively, isoforms  
15 can be encoded by different genes. In the present invention, homologous nucleotide sequences include nucleotide sequences encoding for an ORX polypeptide of species other than humans, including, but not limited to, mammals, and thus can include, *e.g.*, mouse, rat, rabbit, dog, cat, cow, horse, and other organisms. Homologous nucleotide sequences also include, but are not limited to, naturally occurring allelic variations and mutations of the nucleotide sequences set  
20 forth herein. A homologous nucleotide sequence does not, however, include the nucleotide sequence encoding human ORX protein. Homologous nucleic acid sequences include those nucleic acid sequences that encode conservative amino acid substitutions (see below) in the amino acid sequence of an ORX polypeptide, as well as a polypeptide having ORX activity. Biological activities of the ORX proteins are described below. A homologous amino acid  
25 sequence does not encode the amino acid sequence of a human ORX polypeptide.

The nucleotide sequence determined from the cloning of the human ORX gene allows for the generation of probes and primers designed for use in identifying and/or cloning ORX homologues in other cell types, *e.g.*, from other tissues, as well as ORX homologues from other mammals. The probe/primer typically comprises a substantially purified oligonucleotide. The  
30 oligonucleotide typically comprises a region of nucleotide sequence that hybridizes under

stringent conditions to at least about 12, 25, 50, 100, 150, 200, 250, 300, 350 or 400 or more consecutive sense strand nucleotide sequences of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843; or an anti-sense strand nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843; or of a naturally occurring mutant of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

Probes based on the human ORX nucleotide sequence can be used to detect transcripts or genomic sequences encoding the same or homologous proteins. In various embodiments, the probe further comprises a label group attached thereto, *e.g.*, the label group can be a radioisotope, a fluorescent compound, an enzyme, or an enzyme co-factor. Such probes can be used as a part of a diagnostic test kit for identifying cells or tissue which misexpress an ORX protein, such as by measuring a level of an ORX-encoding nucleic acid in a sample of cells from a subject *e.g.*, detecting ORX mRNA levels or determining whether a genomic ORX gene has been mutated or deleted.

A "polypeptide having a biologically active portion of ORX" refers to polypeptides exhibiting activity similar, but not necessarily identical to, an activity of a polypeptide of the present invention, including mature forms, as measured in a particular biological assay, with or without dose dependency. A nucleic acid fragment encoding a "biologically active portion of ORX" can be prepared by isolating a portion of an ORX nucleic acid that encodes a polypeptide having an ORX biological activity (biological activities of the ORX proteins are described below), expressing the encoded portion of ORX protein (*e.g.*, by recombinant expression *in vitro*) and assessing the activity of the encoded portion of ORX. For example, a nucleic acid fragment encoding a biologically active portion of ORX can optionally include an ATP-binding domain. In another embodiment, a nucleic acid fragment encoding a biologically active portion of ORX includes one or more regions.

### ORX Variants

The invention further encompasses nucleic acid molecules that differ from the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 due to the degeneracy of the genetic code. These nucleic acid

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molecules thus encode the same ORX protein as that encoded by the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 *e.g.*, the ORX polypeptides.

5 In addition to the human ORX nucleic acids, it will be appreciated by those skilled in the art that DNA sequence polymorphisms that lead to changes in the amino acid sequences of ORX may exist within a population (*e.g.*, the human population). Such genetic polymorphism in the ORX gene may exist among individuals within a population due to natural allelic variation. As used herein, the terms "gene" and "recombinant gene" refer to nucleic acid molecules comprising an open reading frame encoding an ORX protein, preferably a mammalian ORX protein. Such  
10 natural allelic variations can typically result in 1-5% variance in the nucleotide sequence of the ORX gene. Any and all such nucleotide variations and resulting amino acid polymorphisms in ORX that are the result of natural allelic variation and that do not alter the functional activity of ORX are intended to be within the scope of the invention.

15 Moreover, nucleic acid molecules encoding ORX proteins from other species, and thus that have a nucleotide sequence that differs from the human sequence of the ORX nucleic acid molecules are intended to be within the scope of the invention. Nucleic acid molecules corresponding to natural allelic variants and homologues of the ORX cDNAs of the invention can be isolated based on their homology to the human ORX nucleic acids disclosed herein using the human cDNAs, or a portion thereof, as a hybridization probe according to standard  
20 hybridization techniques under stringent hybridization conditions. For example, a soluble human ORX cDNA can be isolated based on its homology to human membrane-bound ORX. Likewise, a membrane-bound human ORX cDNA can be isolated based on its homology to soluble human ORX.

25 Accordingly, in another embodiment, an isolated nucleic acid molecule of the invention is at least 6 nucleotides in length and hybridizes under stringent conditions to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843. In another embodiment, the nucleic acid is at least 10, 25, 50, 100, 250, 500 or 750 nucleotides in length. In another embodiment, an isolated nucleic acid molecule of the invention hybridizes to the coding region.  
30 As used herein, the term "hybridizes under stringent conditions" is intended to describe

conditions for hybridization and washing under which nucleotide sequences at least 60% homologous to each other typically remain hybridized to each other.

Homologs (*i.e.*, nucleic acids encoding ORX proteins derived from species other than human) or other related sequences (*e.g.*, paralogs) can be obtained by low, moderate or high stringency hybridization with all or a portion of the particular human sequence as a probe using methods well known in the art for nucleic acid hybridization and cloning.

As used herein, the phrase "stringent hybridization conditions" refers to conditions under which a probe, primer or oligonucleotide will hybridize to its target sequence, but to no other sequences. Stringent conditions are sequence-dependent and will be different in different circumstances. Longer sequences hybridize specifically at higher temperatures than shorter sequences. Generally, stringent conditions are selected to be about 5 °C lower than the thermal melting point ( $T_m$ ) for the specific sequence at a defined ionic strength and pH. The  $T_m$  is the temperature (under defined ionic strength, pH and nucleic acid concentration) at which 50% of the probes complementary to the target sequence hybridize to the target sequence at equilibrium. Since the target sequences are generally present at excess, at  $T_m$ , 50% of the probes are occupied at equilibrium. Typically, stringent conditions will be those in which the salt concentration is less than about 1.0 M sodium ion, typically about 0.01 to 1.0 M sodium ion (or other salts) at pH 7.0 to 8.3 and the temperature is at least about 30 °C for short probes, primers or oligonucleotides (*e.g.*, 10 nt to 50 nt) and at least about 60°C for longer probes, primers and oligonucleotides. Stringent conditions may also be achieved with the addition of destabilizing agents, such as formamide.

Stringent conditions are known to those skilled in the art and can be found in CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, N.Y. (1989), 6.3.1-6.3.6. Preferably, the conditions are such that sequences at least about 65%, 70%, 75%, 85%, 90%, 95%, 98%, or 99% homologous to each other typically remain hybridized to each other. A non-limiting example of stringent hybridization conditions is hybridization in a high salt buffer comprising 6X SSC, 50 mM Tris-HCl (pH 7.5), 1 mM EDTA, 0.02% PVP, 0.02% Ficoll, 0.02% BSA, and 500 mg/ml denatured salmon sperm DNA at 65 °C. This hybridization is followed by one or more washes in 0.2X SSC, 0.01% BSA at 50 °C. An isolated nucleic acid molecule of the invention that hybridizes under stringent conditions to the sequence of GenBank Accession Numbers



AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 corresponds to a naturally occurring nucleic acid molecule. As used herein, a "naturally-occurring" nucleic acid molecule refers to an RNA or DNA molecule having a nucleotide sequence that occurs in nature (*e.g.*, encodes a natural protein).

5 In a second embodiment, a nucleic acid sequence that is hybridizable to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or fragments, analogs or derivatives thereof, under conditions of moderate stringency is provided. A non-limiting example of moderate stringency hybridization conditions are hybridization in 6X SSC, 5X  
10 Denhardt's solution, 0.5% SDS and 100 mg/ml denatured salmon sperm DNA at 55°C, followed by one or more washes in 1X SSC, 0.1% SDS at 37 °C. Other conditions of moderate stringency that may be used are well known in the art. See, *e.g.*, Ausubel *et al.* (eds.), 1993, CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, NY, and Kriegler, 1990, GENE TRANSFER AND EXPRESSION, A LABORATORY MANUAL, Stockton Press, NY.

15 In a third embodiment, a nucleic acid that is hybridizable to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or fragments, analogs or derivatives thereof, under conditions of low stringency, is provided. A non-limiting example of low stringency hybridization conditions are hybridization in 35% formamide, 5X SSC, 50 mM  
20 Tris-HCl (pH 7.5), 5 mM EDTA, 0.02% PVP, 0.02% Ficoll, 0.2% BSA, 100 mg/ml denatured salmon sperm DNA, 10% (wt/vol) dextran sulfate at 40 °C, followed by one or more washes in 2X SSC, 25 mM Tris-HCl (pH 7.4), 5 mM EDTA, and 0.1% SDS at 50 °C. Other conditions of low stringency that may be used are well known in the art (*e.g.*, as employed for cross-species hybridizations). See, *e.g.*, Ausubel *et al.* (eds.), 1993, CURRENT PROTOCOLS IN MOLECULAR  
25 BIOLOGY, John Wiley & Sons, NY, and Kriegler, 1990, GENE TRANSFER AND EXPRESSION, A LABORATORY MANUAL, Stockton Press, NY; Shilo and Weinberg, 1981, *Proc Natl Acad Sci USA* 78: 6789-6792.

### Conservative mutations

In addition to naturally-occurring allelic variants of the ORX sequence that may exist in the population, the skilled artisan will further appreciate that changes can be introduced by mutation into the nucleotide sequence of the ORX nucleic acid molecules, thereby leading to changes in the amino acid sequence of the encoded ORX protein, without altering the functional ability of the ORX protein. For example, nucleotide substitutions leading to amino acid substitutions at "non-essential" amino acid residues can be made in the sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843. A "non-essential" amino acid residue is a residue that can be altered from the wild-type sequence of ORX without altering the biological activity, whereas an "essential" amino acid residue is required for biological activity. For example, amino acid residues that are conserved among the ORX proteins of the present invention, are predicted to be particularly unamenable to alteration.

Another aspect of the invention pertains to nucleic acid molecules encoding ORX proteins that contain changes in amino acid residues that are not essential for activity. Such ORX proteins differ in amino acid sequence from the ORX polypeptides, yet retain biological activity. In one embodiment, the isolated nucleic acid molecule comprises a nucleotide sequence encoding a protein, wherein the protein comprises an amino acid sequence at least about 75% homologous to the amino acid sequence of the ORX polypeptides. Preferably, the protein encoded by the nucleic acid is at least about 80% homologous to the sequence of an ORX polypeptide, more preferably at least about 90%, 95%, 98%, and most preferably at least about 99% homologous to the sequence of an ORX polypeptide.

An isolated nucleic acid molecule encoding an ORX protein homologous to the protein of can be created by introducing one or more nucleotide substitutions, additions or deletions into the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, such that one or more amino acid substitutions, additions or deletions are introduced into the encoded protein.

Mutations can be introduced into the nucleotide sequence of the ORX nucleic acid molecules by standard techniques, such as site-directed mutagenesis and PCR-mediated mutagenesis. Preferably, conservative amino acid substitutions are made at one or more predicted non-essential amino acid residues. A "conservative amino acid substitution" is one in



Nucleic acid molecules encoding fragments, homologs, derivatives and analogs of an ORX protein or antisense nucleic acids complementary to an ORX nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 are additionally provided.

5 In one embodiment, an antisense nucleic acid molecule is antisense to a "coding region" of the coding strand of a nucleotide sequence encoding ORX. The term "coding region" refers to the region of the nucleotide sequence comprising codons which are translated into amino acid residues. In another embodiment, the antisense nucleic acid molecule is antisense to a "noncoding region" of the coding strand of a nucleotide sequence encoding ORX. The term  
10 "noncoding region" refers to 5' and 3' sequences which flank the coding region that are not translated into amino acids (*i.e.*, also referred to as 5' and 3' untranslated regions).

Given the coding strand sequences encoding ORX disclosed herein, antisense nucleic acids of the invention can be designed according to the rules of Watson and Crick or Hoogsteen base pairing. The antisense nucleic acid molecule can be complementary to the entire coding  
15 region of ORX mRNA, but more preferably is an oligonucleotide that is antisense to only a portion of the coding or noncoding region of ORX mRNA. For example, the antisense oligonucleotide can be complementary to the region surrounding the translation start site of ORX mRNA. An antisense oligonucleotide can be, for example, about 5, 10, 15, 20, 25, 30, 35, 40, 45 or 50 nucleotides in length. An antisense nucleic acid of the invention can be constructed using  
20 chemical synthesis or enzymatic ligation reactions using procedures known in the art. For example, an antisense nucleic acid (*e.g.*, an antisense oligonucleotide) can be chemically synthesized using naturally occurring nucleotides or variously modified nucleotides designed to increase the biological stability of the molecules or to increase the physical stability of the duplex formed between the antisense and sense nucleic acids, *e.g.*, phosphorothioate derivatives and  
25 acridine substituted nucleotides can be used.

Examples of modified nucleotides that can be used to generate the antisense nucleic acid include: 5-fluorouracil, 5-bromouracil, 5-chlorouracil, 5-iodouracil, hypoxanthine, xanthine, 4-acetylcytosine, 5-(carboxyhydroxymethyl) uracil, 5-carboxymethylaminomethyl-  
2-thiouridine, 5-carboxymethylaminomethyluracil, dihydrouracil, beta-D-galactosylqueosine,  
30 inosine, N6-isopentenyladenine, 1-methylguanine, 1-methylinosine, 2,2-dimethylguanine,

2-methyladenine, 2-methylguanine, 3-methylcytosine, 5-methylcytosine, N6-adenine, 7-methylguanine, 5-methylaminomethyluracil, 5-methoxycarboxymethyl-2-thiouracil, beta-D-mannosylqueosine, 5'-methoxycarboxymethyluracil, 5-methoxyuracil, 2-methylthio-N6-isopentenyladenine, uracil-5-oxyacetic acid (v), wybutoxosine, pseudouracil, queosine, 2-thiocytosine, 5-methyl-2-thiouracil, 2-thiouracil, 4-thiouracil, 5-methyluracil, uracil-5-oxyacetic acid methylester, uracil-5-oxyacetic acid (v), 5-methyl-2-thiouracil, 3-(3-amino-3-N-2-carboxypropyl) uracil, (acp3)w, and 2,6-diaminopurine. Alternatively, the antisense nucleic acid can be produced biologically using an expression vector into which a nucleic acid has been subcloned in an antisense orientation (*i.e.*, RNA transcribed from the inserted nucleic acid will be of an antisense orientation to a target nucleic acid of interest, described further in the following subsection).

The antisense nucleic acid molecules of the invention are typically administered to a subject or generated *in situ* such that they hybridize with or bind to cellular mRNA and/or genomic DNA encoding an ORX protein to thereby inhibit expression of the protein, *e.g.*, by inhibiting transcription and/or translation. The hybridization can be by conventional nucleotide complementarity to form a stable duplex, or, for example, in the case of an antisense nucleic acid molecule that binds to DNA duplexes, through specific interactions in the major groove of the double helix. An example of a route of administration of antisense nucleic acid molecules of the invention includes direct injection at a tissue site. Alternatively, antisense nucleic acid molecules can be modified to target selected cells and then administered systemically. For example, for systemic administration, antisense molecules can be modified such that they specifically bind to receptors or antigens expressed on a selected cell surface, *e.g.*, by linking the antisense nucleic acid molecules to peptides or antibodies that bind to cell surface receptors or antigens. The antisense nucleic acid molecules can also be delivered to cells using the vectors described herein. To achieve sufficient intracellular concentrations of antisense molecules, vector constructs in which the antisense nucleic acid molecule is placed under the control of a strong pol II or pol III promoter are preferred.

In yet another embodiment, the antisense nucleic acid molecule of the invention is an  $\alpha$ -anomeric nucleic acid molecule. An  $\alpha$ -anomeric nucleic acid molecule forms specific double-stranded hybrids with complementary RNA in which, contrary to the usual  $\beta$ -units, the

strands run parallel to each other (Gaultier *et al.* (1987) *Nucleic Acids Res* 15: 6625-6641). The antisense nucleic acid molecule can also comprise a 2'-o-methylribonucleotide (Inoue *et al.* (1987) *Nucleic Acids Res* 15: 6131-6148) or a chimeric RNA -DNA analogue (Inoue *et al.* (1987) *FEBS Lett* 215: 327-330).

Such modifications include, by way of nonlimiting example, modified bases, and nucleic acids whose sugar phosphate backbones are modified or derivatized. These modifications are carried out at least in part to enhance the chemical stability of the modified nucleic acid, such that they may be used, for example, as antisense binding nucleic acids in therapeutic applications in a subject.

### ORX Ribozymes and PNA moieties

In still another embodiment, an antisense nucleic acid of the invention is a ribozyme. Ribozymes are catalytic RNA molecules with ribonuclease activity that are capable of cleaving a single-stranded nucleic acid, such as a mRNA, to which they have a complementary region. Thus, ribozymes (*e.g.*, hammerhead ribozymes (described in Haselhoff and Gerlach (1988) *Nature* 334:585-591)) can be used to catalytically cleave ORX mRNA transcripts to thereby inhibit translation of ORX mRNA. A ribozyme having specificity for an ORX-encoding nucleic acid can be designed based upon the nucleotide sequence of an ORX DNA disclosed herein. For example, a derivative of a *Tetrahymena* L-19 IVS RNA can be constructed in which the nucleotide sequence of the active site is complementary to the nucleotide sequence to be cleaved in an ORX-encoding mRNA. See, *e.g.*, Cech *et al.* U.S. Pat. No. 4,987,071; and Cech *et al.* U.S. Pat. No. 5,116,742. Alternatively, ORX mRNA can be used to select a catalytic RNA having a specific ribonuclease activity from a pool of RNA molecules. See, *e.g.*, Bartel *et al.*, (1993) *Science* 261:1411-1418.

Alternatively, ORX gene expression can be inhibited by targeting nucleotide sequences complementary to the regulatory region of the ORX (*e.g.*, the ORX promoter and/or enhancers) to form triple helical structures that prevent transcription of the ORX gene in target cells. See generally, Helene. (1991) *Anticancer Drug Des.* 6: 569-84; Helene. *et al.* (1992) *Ann. N.Y. Acad. Sci.* 660:27-36; and Maher (1992) *Bioassays* 14: 807-15.

In various embodiments, the nucleic acids of ORX can be modified at the base moiety, sugar moiety or phosphate backbone to improve, *e.g.*, the stability, hybridization, or solubility of the molecule. For example, the deoxyribose phosphate backbone of the nucleic acids can be modified to generate peptide nucleic acids (see Hyrup *et al.* (1996) *Bioorg Med Chem* 4: 5-23).

As used herein, the terms "peptide nucleic acids" or "PNAs" refer to nucleic acid mimics, *e.g.*, DNA mimics, in which the deoxyribose phosphate backbone is replaced by a pseudopeptide backbone and only the four natural nucleobases are retained. The neutral backbone of PNAs has been shown to allow for specific hybridization to DNA and RNA under conditions of low ionic strength. The synthesis of PNA oligomers can be performed using standard solid phase peptide synthesis protocols as described in Hyrup *et al.* (1996) above; Perry-O'Keefe *et al.* (1996) *PNAS* 93: 14670-675.

PNAs of ORX can be used in therapeutic and diagnostic applications. For example, PNAs can be used as antisense or antigene agents for sequence-specific modulation of gene expression by, *e.g.*, inducing transcription or translation arrest or inhibiting replication. PNAs of ORX can also be used, *e.g.*, in the analysis of single base pair mutations in a gene by, *e.g.*, PNA directed PCR clamping; as artificial restriction enzymes when used in combination with other enzymes, *e.g.*, S1 nucleases (Hyrup B. (1996) above); or as probes or primers for DNA sequence and hybridization (Hyrup *et al.* (1996), above; Perry-O'Keefe (1996), above).

In another embodiment, PNAs of ORX can be modified, *e.g.*, to enhance their stability or cellular uptake, by attaching lipophilic or other helper groups to PNA, by the formation of PNA-DNA chimeras, or by the use of liposomes or other techniques of drug delivery known in the art. For example, PNA-DNA chimeras of ORX can be generated that may combine the advantageous properties of PNA and DNA. Such chimeras allow DNA recognition enzymes, *e.g.*, RNase H and DNA polymerases, to interact with the DNA portion while the PNA portion would provide high binding affinity and specificity. PNA-DNA chimeras can be linked using linkers of appropriate lengths selected in terms of base stacking, number of bonds between the nucleobases, and orientation (Hyrup (1996) above). The synthesis of PNA-DNA chimeras can be performed as described in Hyrup (1996) above and Finn *et al.* (1996) *Nucl Acids Res* 24: 3357-63. For example, a DNA chain can be synthesized on a solid support using standard phosphoramidite coupling chemistry, and modified nucleoside analogs, *e.g.*, 5'-(4-methoxytrityl)

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5 amino-5'-deoxy-thymidine phosphoramidite, can be used between the PNA and the 5' end of DNA (Mag *et al.* (1989) *Nucl Acid Res* 17: 5973-88). PNA monomers are then coupled in a stepwise manner to produce a chimeric molecule with a 5' PNA segment and a 3' DNA segment (Finn *et al.* (1996) above). Alternatively, chimeric molecules can be synthesized with a 5' DNA segment and a 3' PNA segment. See, Petersen *et al.* (1975) *Bioorg Med Chem Lett* 5: 1119-11124.

10 In other embodiments, the oligonucleotide may include other appended groups such as peptides (*e.g.*, for targeting host cell receptors *in vivo*), or agents facilitating transport across the cell membrane (see, *e.g.*, Letsinger *et al.*, 1989, *Proc. Natl. Acad. Sci. U.S.A.* 86:6553-6556; Lemaitre *et al.*, 1987, *Proc. Natl. Acad. Sci.* 84:648-652; PCT Publication No. W088/09810) or the blood-brain barrier (see, *e.g.*, PCT Publication No. W089/10134). In addition, oligonucleotides can be modified with hybridization triggered cleavage agents (See, *e.g.*, Krol *et al.*, 1988, *BioTechniques* 6:958-976) or intercalating agents. (See, *e.g.*, Zon, 1988, *Pharm. Res.* 5: 539-549). To this end, the oligonucleotide may be conjugated to another molecule, *e.g.*, a peptide, a hybridization triggered cross-linking agent, a transport agent, a hybridization-triggered cleavage agent, etc.

### ORX Polypeptides

20 An ORX polypeptide of the invention includes the ORX-like protein whose sequence is provided in GenBank Accession Nos. AF127814, AF127816-127819, AF127821-127824, AF127836-127837, AF127840, AF127845-127848, AF127851-127852, AF127857, AF127859, AF127861-127862, AF127865, AF127867-127868, AF127870-127872, AF127874-127884, AF127886, AF127888, AF127896-127904, AF127906-127907, AF179716-179717, AF179720-179728, AF179730-179737, AF179739-179746, AF179748-179750, AF179752, AF179755-179756, AF179758-179761, AF179766-179767, AF179770-179771, AF179773-179775, AF179777-179779, AF179784-179788, AF179790-179792, AF179794, AF179796-179799, AF179802-179811, AF179814, AF179816-179818, AF179820, AF179822-179832, AF179834-179839, AF179841-179843, and AF073959-073989. The invention also includes a mutant or variant protein any of whose residues may be changed from the corresponding residue of the ORX polypeptide while still encoding a protein that maintains its ORX-like activities and

30



physiological functions, or a functional fragment thereof. In some embodiments, up to 20% or more of the residues may be so changed in the mutant or variant protein. In some embodiments, the ORX polypeptide according to the invention is a mature polypeptide.

In general, an ORX -like variant that preserves ORX-like function includes any variant in which residues at a particular position in the sequence have been substituted by other amino acids, and further include the possibility of inserting an additional residue or residues between two residues of the parent protein as well as the possibility of deleting one or more residues from the parent sequence. Any amino acid substitution, insertion, or deletion is encompassed by the invention. In favorable circumstances, the substitution is a conservative substitution as defined above.

One aspect of the invention pertains to isolated ORX proteins, and biologically active portions thereof, or derivatives, fragments, analogs or homologs thereof. Also provided are polypeptide fragments suitable for use as immunogens to raise anti-ORX antibodies. In one embodiment, native ORX proteins can be isolated from cells or tissue sources by an appropriate purification scheme using standard protein purification techniques. In another embodiment, ORX proteins are produced by recombinant DNA techniques. Alternative to recombinant expression, an ORX protein or polypeptide can be synthesized chemically using standard peptide synthesis techniques.

An "isolated" or "purified" protein or biologically active portion thereof is substantially free of cellular material or other contaminating proteins from the cell or tissue source from which the ORX protein is derived, or substantially free from chemical precursors or other chemicals when chemically synthesized. The language "substantially free of cellular material" includes preparations of ORX protein in which the protein is separated from cellular components of the cells from which it is isolated or recombinantly produced. In one embodiment, the language "substantially free of cellular material" includes preparations of ORX protein having less than about 30% (by dry weight) of non-ORX protein (also referred to herein as a "contaminating protein"), more preferably less than about 20% of non-ORX protein, still more preferably less than about 10% of non-ORX protein, and most preferably less than about 5% non-ORX protein. When the ORX protein or biologically active portion thereof is recombinantly produced, it is also preferably substantially free of culture medium, *i.e.*, culture medium represents less than about

20%, more preferably less than about 10%, and most preferably less than about 5% of the volume of the protein preparation.

The language "substantially free of chemical precursors or other chemicals" includes preparations of ORX protein in which the protein is separated from chemical precursors or other chemicals that are involved in the synthesis of the protein. In one embodiment, the language "substantially free of chemical precursors or other chemicals" includes preparations of ORX protein having less than about 30% (by dry weight) of chemical precursors or non-ORX chemicals, more preferably less than about 20% chemical precursors or non-ORX chemicals, still more preferably less than about 10% chemical precursors or non-ORX chemicals, and most preferably less than about 5% chemical precursors or non-ORX chemicals.

Biologically active portions of an ORX protein include peptides comprising amino acid sequences sufficiently homologous to or derived from the amino acid sequence of the ORX protein, *e.g.*, the amino acid sequence of the ORX polypeptides that include fewer amino acids than the full length ORX proteins, and exhibit at least one activity of an ORX protein. Typically, biologically active portions comprise a domain or motif with at least one activity of the ORX protein. A biologically active portion of an ORX protein can be a polypeptide which is, for example, 10, 25, 50, 100 or more amino acids in length.

In some embodiments, an ORX protein of the invention includes the amino acid sequence of the herein described polypeptide and a number of amino acids on the amino terminus of the ORX protein, the carboxy terminus of the ORX protein, or a number of amino acids on both termini of the disclosed ORX protein. Thus, the ORX protein can include 1, 2, 3, 4, 5, 10, 15, 20, 25, 50, or 75 or more amino acids on the amino terminus, the carboxy terminus, or both termini of the disclosed amino acid sequence.

A biologically active portion of an ORX protein of the present invention may contain at least one of the above-identified domains conserved between the ORX proteins, *e.g.* TSR modules. Moreover, other biologically active portions, in which other regions of the protein are deleted, can be prepared by recombinant techniques and evaluated for one or more of the functional activities of a native ORX protein.

In an embodiment, the ORX protein has an amino acid sequence of an ORX polypeptides. In other embodiments, the ORX protein is substantially homologous to an ORX polypeptide and

retains the functional activity of the ORX polypeptide yet differs in amino acid sequence due to natural allelic variation or mutagenesis, as described in detail below. Accordingly, in another embodiment, the ORX protein is a protein that comprises an amino acid sequence at least about 45% homologous to the amino acid sequence of an ORX polypeptide and retains the functional activity of the ORX polypeptides.

### **Determining homology between two or more sequence**

To determine the percent homology of two amino acid sequences or of two nucleic acids, the sequences are aligned for optimal comparison purposes (*e.g.*, gaps can be introduced in either of the sequences being compared for optimal alignment between the sequences). The amino acid residues or nucleotides at corresponding amino acid positions or nucleotide positions are then compared. When a position in the first sequence is occupied by the same amino acid residue or nucleotide as the corresponding position in the second sequence, then the molecules are homologous at that position (*i.e.*, as used herein amino acid or nucleic acid "homology" is equivalent to amino acid or nucleic acid "identity").

The nucleic acid sequence homology may be determined as the degree of identity between two sequences. The homology may be determined using computer programs known in the art, such as GAP software provided in the GCG program package. See, *Needleman and Wunsch* 1970 *J Mol Biol* 48: 443-453. Using GCG GAP software with the following settings for nucleic acid sequence comparison: GAP creation penalty of 5.0 and GAP extension penalty of 0.3, the coding region of the analogous nucleic acid sequences referred to above exhibits a degree of identity preferably of at least 70%, 75%, 80%, 85%, 90%, 95%, 98%, or 99%, with the CDS (encoding) part of the DNA sequence shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

The term "sequence identity" refers to the degree to which two polynucleotide or polypeptide sequences are identical on a residue-by-residue basis over a particular region of comparison. The term "percentage of sequence identity" is calculated by comparing two optimally aligned sequences over that region of comparison, determining the number of positions at which the identical nucleic acid base (*e.g.*, A, T, C, G, U, or I, in the case of nucleic acids) occurs in both sequences to yield the number of matched positions, dividing the number of

matched positions by the total number of positions in the region of comparison (*i.e.*, the window size), and multiplying the result by 100 to yield the percentage of sequence identity. The term "substantial identity" as used herein denotes a characteristic of a polynucleotide sequence, wherein the polynucleotide comprises a sequence that has at least 80 percent sequence identity, preferably at least 85 percent identity and often 90 to 95 percent sequence identity, more usually at least 99 percent sequence identity as compared to a reference sequence over a comparison region. The term "percentage of positive residues" is calculated by comparing two optimally aligned sequences over that region of comparison, determining the number of positions at which the identical and conservative amino acid substitutions, as defined above, occur in both sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the region of comparison (*i.e.*, the window size), and multiplying the result by 100 to yield the percentage of positive residues.

#### **Chimeric and fusion proteins**

The invention also provides ORX chimeric or fusion proteins. As used herein, an ORX "chimeric protein" or "fusion protein" comprises an ORX polypeptide operatively linked to a non-ORX polypeptide. An "ORX polypeptide" refers to a polypeptide having an amino acid sequence corresponding to ORX, whereas a "non-ORX polypeptide" refers to a polypeptide having an amino acid sequence corresponding to a protein that is not substantially homologous to the ORX protein, *e.g.*, a protein that is different from the ORX protein and that is derived from the same or a different organism. Within an ORX fusion protein the ORX polypeptide can correspond to all or a portion of an ORX protein. In one embodiment, an ORX fusion protein comprises at least one biologically active portion of an ORX protein. In another embodiment, an ORX fusion protein comprises at least two biologically active portions of an ORX protein. Within the fusion protein, the term "operatively linked" is intended to indicate that the ORX polypeptide and the non-ORX polypeptide are fused in-frame to each other. The non-ORX polypeptide can be fused to the N-terminus or C-terminus of the ORX polypeptide.

For example, in one embodiment an ORX fusion protein comprises an ORX polypeptide operably linked to the extracellular domain of a second protein. Such fusion proteins can be

further utilized in screening assays for compounds that modulate ORX activity (such assays are described in detail below).

In another embodiment, the fusion protein is a GST-ORX fusion protein in which the ORX sequences are fused to the C-terminus of the GST (*i.e.*, glutathione S-transferase) sequences. Such fusion proteins can facilitate the purification of recombinant ORX.

In another embodiment, the fusion protein is an ORX-immunoglobulin fusion protein in which the ORX sequences comprising one or more domains are fused to sequences derived from a member of the immunoglobulin protein family. The ORX-immunoglobulin fusion proteins of the invention can be incorporated into pharmaceutical compositions and administered to a subject to inhibit an interaction between an ORX ligand and an ORX protein on the surface of a cell, to thereby suppress ORX-mediated signal transduction *in vivo*. In one nonlimiting example, a contemplated ORX ligand of the invention is the ORX receptor. The ORX-immunoglobulin fusion proteins can be used to affect the bioavailability of an ORX cognate ligand. Inhibition of the ORX ligand/ORX interaction may be useful therapeutically for both the treatment of proliferative and differentiative disorders, *e.g.*, cancer as well as modulating (*e.g.*, promoting or inhibiting) cell survival. Moreover, the ORX-immunoglobulin fusion proteins of the invention can be used as immunogens to produce anti-ORX antibodies in a subject, to purify ORX ligands, and in screening assays to identify molecules that inhibit the interaction of ORX with an ORX ligand.

An ORX chimeric or fusion protein of the invention can be produced by standard recombinant DNA techniques. For example, DNA fragments coding for the different polypeptide sequences are ligated together in-frame in accordance with conventional techniques, *e.g.*, by employing blunt-ended or stagger-ended termini for ligation, restriction enzyme digestion to provide for appropriate termini, filling-in of cohesive ends as appropriate, alkaline phosphatase treatment to avoid undesirable joining, and enzymatic ligation. In another embodiment, the fusion gene can be synthesized by conventional techniques including automated DNA synthesizers. Alternatively, PCR amplification of gene fragments can be carried out using anchor primers that give rise to complementary overhangs between two consecutive gene fragments that can subsequently be annealed and reamplified to generate a chimeric gene sequence (see, for example, Ausubel et al. (eds.) CURRENT PROTOCOLS IN MOLECULAR BIOLOGY,

John Wiley & Sons, 1992). Moreover, many expression vectors are commercially available that already encode a fusion moiety (*e.g.*, a GST polypeptide). An ORX-encoding nucleic acid can be cloned into such an expression vector such that the fusion moiety is linked in-frame to the ORX protein.

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### **ORX agonists and antagonists**

The present invention also pertains to variants of the ORX proteins that function as either ORX agonists (mimetics) or as ORX antagonists. Variants of the ORX protein can be generated by mutagenesis, *e.g.*, discrete point mutation or truncation of the ORX protein. An agonist of the ORX protein can retain substantially the same, or a subset of, the biological activities of the naturally occurring form of the ORX protein. An antagonist of the ORX protein can inhibit one or more of the activities of the naturally occurring form of the ORX protein by, for example, competitively binding to a downstream or upstream member of a cellular signaling cascade which includes the ORX protein. Thus, specific biological effects can be elicited by treatment with a variant of limited function. In one embodiment, treatment of a subject with a variant having a subset of the biological activities of the naturally occurring form of the protein has fewer side effects in a subject relative to treatment with the naturally occurring form of the ORX proteins.

Variants of the ORX protein that function as either ORX agonists (mimetics) or as ORX antagonists can be identified by screening combinatorial libraries of mutants, *e.g.*, truncation mutants, of the ORX protein for ORX protein agonist or antagonist activity. In one embodiment, a variegated library of ORX variants is generated by combinatorial mutagenesis at the nucleic acid level and is encoded by a variegated gene library. A variegated library of ORX variants can be produced by, for example, enzymatically ligating a mixture of synthetic oligonucleotides into gene sequences such that a degenerate set of potential ORX sequences is expressible as individual polypeptides, or alternatively, as a set of larger fusion proteins (*e.g.*, for phage display) containing the set of ORX sequences therein. There are a variety of methods which can be used to produce libraries of potential ORX variants from a degenerate oligonucleotide sequence. Chemical synthesis of a degenerate gene sequence can be performed in an automatic DNA synthesizer, and the synthetic gene then ligated into an appropriate expression vector. Use

of a degenerate set of genes allows for the provision, in one mixture, of all of the sequences encoding the desired set of potential ORX sequences. Methods for synthesizing degenerate oligonucleotides are known in the art (see, *e.g.*, Narang (1983) *Tetrahedron* 39:3; Itakura *et al.* (1984) *Annu Rev Biochem* 53:323; Itakura *et al.* (1984) *Science* 198:1056; Ike *et al.* (1983) *Nucl Acid Res* 11:477.

### Polypeptide libraries

In addition, libraries of fragments of the ORX protein coding sequence can be used to generate a variegated population of ORX fragments for screening and subsequent selection of variants of an ORX protein. In one embodiment, a library of coding sequence fragments can be generated by treating a double stranded PCR fragment of an ORX coding sequence with a nuclease under conditions wherein nicking occurs only about once per molecule, denaturing the double stranded DNA, renaturing the DNA to form double stranded DNA that can include sense/antisense pairs from different nicked products, removing single stranded portions from reformed duplexes by treatment with S1 nuclease, and ligating the resulting fragment library into an expression vector. By this method, an expression library can be derived which encodes N-terminal and internal fragments of various sizes of the ORX protein.

Several techniques are known in the art for screening gene products of combinatorial libraries made by point mutations or truncation, and for screening cDNA libraries for gene products having a selected property. Such techniques are adaptable for rapid screening of the gene libraries generated by the combinatorial mutagenesis of ORX proteins. The most widely used techniques, which are amenable to high throughput analysis, for screening large gene libraries typically include cloning the gene library into replicable expression vectors, transforming appropriate cells with the resulting library of vectors, and expressing the combinatorial genes under conditions in which detection of a desired activity facilitates isolation of the vector encoding the gene whose product was detected. Recursive ensemble mutagenesis (REM), a new technique that enhances the frequency of functional mutants in the libraries, can be used in combination with the screening assays to identify ORX variants (Arkin and Yourvan (1992) *PNAS* 89:7811-7815; Delgrave *et al.* (1993) *Protein Engineering* 6:327-331).

## ORX Antibodies

Also included in the invention are antibodies to ORX proteins, or fragments of ORX proteins. The term "antibody" as used herein refers to immunoglobulin molecules and immunologically active portions of immunoglobulin (Ig) molecules, *i.e.*, molecules that contain an antigen binding site that specifically binds (immunoreacts with) an antigen. Such antibodies include, but are not limited to, polyclonal, monoclonal, chimeric, single chain,  $F_{ab}$ ,  $F_{ab'}$ , and  $F_{(ab')_2}$  fragments, and an  $F_{ab}$  expression library. In general, an antibody molecule obtained from humans relates to any of the classes IgG, IgM, IgA, IgE and IgD, which differ from one another by the nature of the heavy chain present in the molecule. Certain classes have subclasses as well, such as IgG<sub>1</sub>, IgG<sub>2</sub>, and others. Furthermore, in humans, the light chain may be a kappa chain or a lambda chain. Reference herein to antibodies includes a reference to all such classes, subclasses and types of human antibody species.

An isolated ORX-related protein of the invention may be intended to serve as an antigen, or a portion or fragment thereof, and additionally can be used as an immunogen to generate antibodies that immunospecifically bind the antigen, using standard techniques for polyclonal and monoclonal antibody preparation. The full-length protein can be used or, alternatively, the invention provides antigenic peptide fragments of the antigen for use as immunogens. An antigenic peptide fragment comprises at least 6 amino acid residues of the amino acid sequence of the full length protein and encompasses an epitope thereof such that an antibody raised against the peptide forms a specific immune complex with the full length protein or with any fragment that contains the epitope. Preferably, the antigenic peptide comprises at least 10 amino acid residues, or at least 15 amino acid residues, or at least 20 amino acid residues, or at least 30 amino acid residues. Preferred epitopes encompassed by the antigenic peptide are regions of the protein that are located on its surface; commonly these are hydrophilic regions.

In certain embodiments of the invention, at least one epitope encompassed by the antigenic peptide is a region of ORX-related protein that is located on the surface of the protein, *e.g.*, a hydrophilic region. A hydrophobicity analysis of the human ORX-related protein sequence will indicate which regions of an ORX-related protein are particularly hydrophilic and, therefore, are likely to encode surface residues useful for targeting antibody production. As a means for targeting antibody production, hydropathy plots showing regions of hydrophilicity and



hydrophobicity may be generated by any method well known in the art, including, for example, the Kyte Doolittle or the Hopp Woods methods, either with or without Fourier transformation. See, e.g., Hopp and Woods, 1981, *Proc. Nat. Acad. Sci. USA* 78: 3824-3828; Kyte and Doolittle 1982, *J. Mol. Biol.* 157: 105-142, each of which is incorporated herein by reference in its entirety. Antibodies that are specific for one or more domains within an antigenic protein, or derivatives, fragments, analogs or homologs thereof, are also provided herein.

A protein of the invention, or a derivative, fragment, analog, homolog or ortholog thereof, may be utilized as an immunogen in the generation of antibodies that immunospecifically bind these protein components.

Various procedures known within the art may be used for the production of polyclonal or monoclonal antibodies directed against a protein of the invention, or against derivatives, fragments, analogs homologs or orthologs thereof (see, for example, *Antibodies: A Laboratory Manual*, Harlow E, and Lane D, 1988, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, incorporated herein by reference). Some of these antibodies are discussed below.

### **Polyclonal Antibodies**

For the production of polyclonal antibodies, various suitable host animals (e.g., rabbit, goat, mouse or other mammal) may be immunized by one or more injections with the native protein, a synthetic variant thereof, or a derivative of the foregoing. An appropriate immunogenic preparation can contain, for example, the naturally occurring immunogenic protein, a chemically synthesized polypeptide representing the immunogenic protein, or a recombinantly expressed immunogenic protein. Furthermore, the protein may be conjugated to a second protein known to be immunogenic in the mammal being immunized. Examples of such immunogenic proteins include but are not limited to keyhole limpet hemocyanin, serum albumin, bovine thyroglobulin, and soybean trypsin inhibitor. The preparation can further include an adjuvant. Various adjuvants used to increase the immunological response include, but are not limited to, Freund's (complete and incomplete), mineral gels (e.g., aluminum hydroxide), surface active substances (e.g., lysolecithin, pluronic polyols, polyanions, peptides, oil emulsions, dinitrophenol, etc.), adjuvants usable in humans such as Bacille Calmette-Guerin and *Corynebacterium parvum*, or similar immunostimulatory agents. Additional examples of

adjuvants which can be employed include MPL-TDM adjuvant (monophosphoryl Lipid A, synthetic trehalose dicorynomycolate).

The polyclonal antibody molecules directed against the immunogenic protein can be isolated from the mammal (*e.g.*, from the blood) and further purified by well known techniques, such as affinity chromatography using protein A or protein G, which provide primarily the IgG fraction of immune serum. Subsequently, or alternatively, the specific antigen which is the target of the immunoglobulin sought, or an epitope thereof, may be immobilized on a column to purify the immune specific antibody by immunoaffinity chromatography. Purification of immunoglobulins is discussed, for example, by D. Wilkinson (*The Scientist*, published by The Scientist, Inc., Philadelphia PA, Vol. 14, No. 8 (April 17, 2000), pp. 25-28).

### Monoclonal Antibodies

The term "monoclonal antibody" (MAb) or "monoclonal antibody composition", as used herein, refers to a population of antibody molecules that contain only one molecular species of antibody molecule consisting of a unique light chain gene product and a unique heavy chain gene product. In particular, the complementarity determining regions (CDRs) of the monoclonal antibody are identical in all the molecules of the population. MAbs thus contain an antigen binding site capable of immunoreacting with a particular epitope of the antigen characterized by a unique binding affinity for it.

Monoclonal antibodies can be prepared using hybridoma methods, such as those described by Kohler and Milstein, *Nature*, 256:495 (1975). In a hybridoma method, a mouse, hamster, or other appropriate host animal, is typically immunized with an immunizing agent to elicit lymphocytes that produce or are capable of producing antibodies that will specifically bind to the immunizing agent. Alternatively, the lymphocytes can be immunized *in vitro*.

The immunizing agent will typically include the protein antigen, a fragment thereof or a fusion protein thereof. Generally, either peripheral blood lymphocytes are used if cells of human origin are desired, or spleen cells or lymph node cells are used if non-human mammalian sources are desired. The lymphocytes are then fused with an immortalized cell line using a suitable fusing agent, such as polyethylene glycol, to form a hybridoma cell (Goding, *Monoclonal Antibodies: Principles and Practice*, Academic Press, (1986) pp. 59-103). Immortalized cell lines

are usually transformed mammalian cells, particularly myeloma cells of rodent, bovine and human origin. Usually, rat or mouse myeloma cell lines are employed. The hybridoma cells can be cultured in a suitable culture medium that preferably contains one or more substances that inhibit the growth or survival of the unfused, immortalized cells. For example, if the parental  
5 cells lack the enzyme hypoxanthine guanine phosphoribosyl transferase (HGPRT or HPRT), the culture medium for the hybridomas typically will include hypoxanthine, aminopterin, and thymidine ("HAT medium"), which substances prevent the growth of HGPRT-deficient cells.

Preferred immortalized cell lines are those that fuse efficiently, support stable high level expression of antibody by the selected antibody-producing cells, and are sensitive to a medium  
10 such as HAT medium. More preferred immortalized cell lines are murine myeloma lines, which can be obtained, for instance, from the Salk Institute Cell Distribution Center, San Diego, California and the American Type Culture Collection, Manassas, Virginia. Human myeloma and mouse-human heteromyeloma cell lines also have been described for the production of human monoclonal antibodies (Kozbor, J. Immunol., 133:3001 (1984); Brodeur et al., Monoclonal  
15 Antibody Production Techniques and Applications, Marcel Dekker, Inc., New York, (1987) pp. 51-63).

The culture medium in which the hybridoma cells are cultured can then be assayed for the presence of monoclonal antibodies directed against the antigen. Preferably, the binding specificity of monoclonal antibodies produced by the hybridoma cells is determined by  
20 immunoprecipitation or by an *in vitro* binding assay, such as radioimmunoassay (RIA) or enzyme-linked immunoabsorbent assay (ELISA). Such techniques and assays are known in the art. The binding affinity of the monoclonal antibody can, for example, be determined by the Scatchard analysis of Munson and Pollard, Anal. Biochem., 107:220 (1980). Preferably, antibodies having a high degree of specificity and a high binding affinity for the target antigen  
25 are isolated.

After the desired hybridoma cells are identified, the clones can be subcloned by limiting dilution procedures and grown by standard methods. Suitable culture media for this purpose include, for example, Dulbecco's Modified Eagle's Medium and RPMI-1640 medium. Alternatively, the hybridoma cells can be grown *in vivo* as ascites in a mammal.

The monoclonal antibodies secreted by the subclones can be isolated or purified from the culture medium or ascites fluid by conventional immunoglobulin purification procedures such as, for example, protein A-Sepharose, hydroxylapatite chromatography, gel electrophoresis, dialysis, or affinity chromatography.

5 The monoclonal antibodies can also be made by recombinant DNA methods, such as those described in U.S. Patent No. 4,816,567. DNA encoding the monoclonal antibodies of the invention can be readily isolated and sequenced using conventional procedures (*e.g.*, by using oligonucleotide probes that are capable of binding specifically to genes encoding the heavy and light chains of murine antibodies). The hybridoma cells of the invention serve as a preferred  
10 source of such DNA. Once isolated, the DNA can be placed into expression vectors, which are then transfected into host cells such as simian COS cells, Chinese hamster ovary (CHO) cells, or myeloma cells that do not otherwise produce immunoglobulin protein, to obtain the synthesis of monoclonal antibodies in the recombinant host cells. The DNA also can be modified, for example, by substituting the coding sequence for human heavy and light chain constant domains in place of the homologous murine sequences (U.S. Patent No. 4,816,567; Morrison, Nature 368,  
15 812-13 (1994)) or by covalently joining to the immunoglobulin coding sequence all or part of the coding sequence for a non-immunoglobulin polypeptide. Such a non-immunoglobulin polypeptide can be substituted for the constant domains of an antibody of the invention, or can be substituted for the variable domains of one antigen-combining site of an antibody of the  
20 invention to create a chimeric bivalent antibody.

### Humanized Antibodies

The antibodies directed against the protein antigens of the invention can further comprise humanized antibodies or human antibodies. These antibodies are suitable for administration to  
25 humans without engendering an immune response by the human against the administered immunoglobulin. Humanized forms of antibodies are chimeric immunoglobulins, immunoglobulin chains or fragments thereof (such as Fv, Fab, Fab', F(ab')<sub>2</sub> or other antigen-binding subsequences of antibodies) that are principally comprised of the sequence of a human immunoglobulin, and contain minimal sequence derived from a non-human immunoglobulin.  
30 Humanization can be performed following the method of Winter and co-workers (Jones et al.,

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Nature, 321:522-525 (1986); Riechmann et al., Nature, 332:323-327 (1988); Verhoeven et al., Science, 239:1534-1536 (1988)), by substituting rodent CDRs or CDR sequences for the corresponding sequences of a human antibody. (See also U.S. Patent No. 5,225,539.) In some instances, Fv framework residues of the human immunoglobulin are replaced by corresponding non-human residues. Humanized antibodies can also comprise residues which are found neither in the recipient antibody nor in the imported CDR or framework sequences. In general, the humanized antibody will comprise substantially all of at least one, and typically two, variable domains, in which all or substantially all of the CDR regions correspond to those of a non-human immunoglobulin and all or substantially all of the framework regions are those of a human immunoglobulin consensus sequence. The humanized antibody optimally also will comprise at least a portion of an immunoglobulin constant region (Fc), typically that of a human immunoglobulin (Jones et al., 1986; Riechmann et al., 1988; and Presta, Curr. Op. Struct. Biol., 2:593-596 (1992)).

### Human Antibodies

Fully human antibodies relate to antibody molecules in which essentially the entire sequences of both the light chain and the heavy chain, including the CDRs, arise from human genes. Such antibodies are termed "human antibodies", or "fully human antibodies" herein. Human monoclonal antibodies can be prepared by the trioma technique; the human B-cell hybridoma technique (see Kozbor, et al., 1983 Immunol Today 4: 72) and the EBV hybridoma technique to produce human monoclonal antibodies (see Cole, et al., 1985 In: MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96). Human monoclonal antibodies may be utilized in the practice of the present invention and may be produced by using human hybridomas (see Cote, et al., 1983. Proc Natl Acad Sci USA 80: 2026-2030) or by transforming human B-cells with Epstein Barr Virus *in vitro* (see Cole, et al., 1985 In: MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96).

In addition, human antibodies can also be produced using additional techniques, including phage display libraries (Hoogenboom and Winter, J. Mol. Biol., 227:381 (1991); Marks et al., J. Mol. Biol., 222:581 (1991)). Similarly, human antibodies can be made by introducing human immunoglobulin loci into transgenic animals, *e.g.*, mice in which the

endogenous immunoglobulin genes have been partially or completely inactivated. Upon challenge, human antibody production is observed, which closely resembles that seen in humans in all respects, including gene rearrangement, assembly, and antibody repertoire. This approach is described, for example, in U.S. Patent Nos. 5,545,807; 5,545,806; 5,569,825; 5,625,126; 5,633,425; 5,661,016, and in Marks et al. (Bio/Technology 10, 779-783 (1992)); Lonberg et al. (Nature 368 856-859 (1994)); Morrison (Nature 368, 812-13 (1994)); Fishwild et al. (Nature Biotechnology 14, 845-51 (1996)); Neuberger (Nature Biotechnology 14, 826 (1996)); and Lonberg and Huszar (Intern. Rev. Immunol. 13 65-93 (1995)).

Human antibodies may additionally be produced using transgenic nonhuman animals which are modified so as to produce fully human antibodies rather than the animal's endogenous antibodies in response to challenge by an antigen. (See PCT publication WO94/02602). The endogenous genes encoding the heavy and light immunoglobulin chains in the nonhuman host have been incapacitated, and active loci encoding human heavy and light chain immunoglobulins are inserted into the host's genome. The human genes are incorporated, for example, using yeast artificial chromosomes containing the requisite human DNA segments. An animal which provides all the desired modifications is then obtained as progeny by crossbreeding intermediate transgenic animals containing fewer than the full complement of the modifications. The preferred embodiment of such a nonhuman animal is a mouse, and is termed the Xenomouse™ as disclosed in PCT publications WO 96/33735 and WO 96/34096. This animal produces B cells which secrete fully human immunoglobulins. The antibodies can be obtained directly from the animal after immunization with an immunogen of interest, as, for example, a preparation of a polyclonal antibody, or alternatively from immortalized B cells derived from the animal, such as hybridomas producing monoclonal antibodies. Additionally, the genes encoding the immunoglobulins with human variable regions can be recovered and expressed to obtain the antibodies directly, or can be further modified to obtain analogs of antibodies such as, for example, single chain Fv molecules.

An example of a method of producing a nonhuman host, exemplified as a mouse, lacking expression of an endogenous immunoglobulin heavy chain is disclosed in U.S. Patent No. 5,939,598. It can be obtained by a method including deleting the J segment genes from at least one endogenous heavy chain locus in an embryonic stem cell to prevent rearrangement of the

locus and to prevent formation of a transcript of a rearranged immunoglobulin heavy chain locus, the deletion being effected by a targeting vector containing a gene encoding a selectable marker; and producing from the embryonic stem cell a transgenic mouse whose somatic and germ cells contain the gene encoding the selectable marker.

5 A method for producing an antibody of interest, such as a human antibody, is disclosed in U.S. Patent No. 5,916,771. It includes introducing an expression vector that contains a nucleotide sequence encoding a heavy chain into one mammalian host cell in culture, introducing an expression vector containing a nucleotide sequence encoding a light chain into another mammalian host cell, and fusing the two cells to form a hybrid cell. The hybrid cell expresses an antibody containing the heavy chain and the light chain.

10 In a further improvement on this procedure, a method for identifying a clinically relevant epitope on an immunogen, and a correlative method for selecting an antibody that binds immunospecifically to the relevant epitope with high affinity, are disclosed in PCT publication WO 99/53049.

#### 15 **F<sub>ab</sub> Fragments and Single Chain Antibodies**

According to the invention, techniques can be adapted for the production of single-chain antibodies specific to an antigenic protein of the invention (see *e.g.*, U.S. Patent No. 4,946,778). In addition, methods can be adapted for the construction of F<sub>ab</sub> expression libraries (see *e.g.*, Huse, et al., 1989 Science 246: 1275-1281) to allow rapid and effective identification of monoclonal F<sub>ab</sub> fragments with the desired specificity for a protein or derivatives, fragments, analogs or homologs thereof. Antibody fragments that contain the idiotype to a protein antigen may be produced by techniques known in the art including, but not limited to: (i) an F<sub>(ab')<sub>2</sub></sub> fragment produced by pepsin digestion of an antibody molecule; (ii) an F<sub>ab</sub> fragment generated by reducing the disulfide bridges of an F<sub>(ab')<sub>2</sub></sub> fragment; (iii) an F<sub>ab</sub> fragment generated by the treatment of the antibody molecule with papain and a reducing agent and (iv) F<sub>v</sub> fragments.

#### 25 **Bispecific Antibodies**

Bispecific antibodies are monoclonal, preferably human or humanized, antibodies that have binding specificities for at least two different antigens. In the present case, one of the

binding specificities is for an antigenic protein of the invention. The second binding target is any other antigen, and advantageously is a cell-surface protein or receptor or receptor subunit.

Methods for making bispecific antibodies are known in the art. Traditionally, the recombinant production of bispecific antibodies is based on the co-expression of two immunoglobulin heavy-chain/light-chain pairs, where the two heavy chains have different specificities (Milstein and Cuello, Nature, 305:537-539 (1983)). Because of the random assortment of immunoglobulin heavy and light chains, these hybridomas (quadromas) produce a potential mixture of ten different antibody molecules, of which only one has the correct bispecific structure. The purification of the correct molecule is usually accomplished by affinity chromatography steps. Similar procedures are disclosed in WO 93/08829, published 13 May 1993, and in Traunecker *et al.*, 1991 *EMBO J.*, 10:3655-3659.

Antibody variable domains with the desired binding specificities (antibody-antigen combining sites) can be fused to immunoglobulin constant domain sequences. The fusion preferably is with an immunoglobulin heavy-chain constant domain, comprising at least part of the hinge, CH2, and CH3 regions. It is preferred to have the first heavy-chain constant region (CH1) containing the site necessary for light-chain binding present in at least one of the fusions. DNAs encoding the immunoglobulin heavy-chain fusions and, if desired, the immunoglobulin light chain, are inserted into separate expression vectors, and are co-transfected into a suitable host organism. For further details of generating bispecific antibodies see, for example, Suresh *et al.*, Methods in Enzymology, 121:210 (1986).

According to another approach described in WO 96/27011, the interface between a pair of antibody molecules can be engineered to maximize the percentage of heterodimers which are recovered from recombinant cell culture. The preferred interface comprises at least a part of the CH3 region of an antibody constant domain. In this method, one or more small amino acid side chains from the interface of the first antibody molecule are replaced with larger side chains (*e.g.* tyrosine or tryptophan). Compensatory "cavities" of identical or similar size to the large side chain(s) are created on the interface of the second antibody molecule by replacing large amino acid side chains with smaller ones (*e.g.* alanine or threonine). This provides a mechanism for increasing the yield of the heterodimer over other unwanted end-products such as homodimers.



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Bispecific antibodies can be prepared as full length antibodies or antibody fragments (e.g. F(ab')<sub>2</sub> bispecific antibodies). Techniques for generating bispecific antibodies from antibody fragments have been described in the literature. For example, bispecific antibodies can be prepared using chemical linkage. Brennan et al., Science 229:81 (1985) describe a procedure wherein intact antibodies are proteolytically cleaved to generate F(ab')<sub>2</sub> fragments. These fragments are reduced in the presence of the dithiol complexing agent sodium arsenite to stabilize vicinal dithiols and prevent intermolecular disulfide formation. The Fab' fragments generated are then converted to thionitrobenzoate (TNB) derivatives. One of the Fab'-TNB derivatives is then reconverted to the Fab'-thiol by reduction with mercaptoethylamine and is mixed with an equimolar amount of the other Fab'-TNB derivative to form the bispecific antibody. The bispecific antibodies produced can be used as agents for the selective immobilization of enzymes.

Additionally, Fab' fragments can be directly recovered from E. coli and chemically coupled to form bispecific antibodies. Shalaby et al., J. Exp. Med. 175:217-225 (1992) describe the production of a fully humanized bispecific antibody F(ab')<sub>2</sub> molecule. Each Fab' fragment was separately secreted from E. coli and subjected to directed chemical coupling *in vitro* to form the bispecific antibody. The bispecific antibody thus formed was able to bind to cells overexpressing the ErbB2 receptor and normal human T cells, as well as trigger the lytic activity of human cytotoxic lymphocytes against human breast tumor targets.

Various techniques for making and isolating bispecific antibody fragments directly from recombinant cell culture have also been described. For example, bispecific antibodies have been produced using leucine zippers. Kostelny et al., J. Immunol. 148(5):1547-1553 (1992). The leucine zipper peptides from the Fos and Jun proteins were linked to the Fab' portions of two different antibodies by gene fusion. The antibody homodimers were reduced at the hinge region to form monomers and then re-oxidized to form the antibody heterodimers. This method can also be utilized for the production of antibody homodimers. The "diabody" technology described by Hollinger et al., Proc. Natl. Acad. Sci. USA 90:6444-6448 (1993) has provided an alternative mechanism for making bispecific antibody fragments. The fragments comprise a heavy-chain variable domain (V<sub>H</sub>) connected to a light-chain variable domain (V<sub>L</sub>) by a linker which is too short to allow pairing between the two domains on the same chain. Accordingly, the V<sub>H</sub> and V<sub>L</sub>

domains of one fragment are forced to pair with the complementary  $V_L$  and  $V_H$  domains of another fragment, thereby forming two antigen-binding sites. Another strategy for making bispecific antibody fragments by the use of single-chain Fv (sFv) dimers has also been reported. See, Gruber et al., J. Immunol. 152:5368 (1994).

5           Antibodies with more than two valencies are contemplated. For example, trispecific antibodies can be prepared. Tutt et al., J. Immunol. 147:60 (1991).

Exemplary bispecific antibodies can bind to two different epitopes, at least one of which originates in the protein antigen of the invention. Alternatively, an anti-antigenic arm of an immunoglobulin molecule can be combined with an arm which binds to a triggering molecule on a leukocyte such as a T-cell receptor molecule (e.g. CD2, CD3, CD28, or B7), or Fc receptors for IgG (Fc R), such as Fc RI (CD64), Fc RII (CD32) and Fc RIII (CD16) so as to focus cellular defense mechanisms to the cell expressing the particular antigen. Bispecific antibodies can also be used to direct cytotoxic agents to cells which express a particular antigen. These antibodies possess an antigen-binding arm and an arm which binds a cytotoxic agent or a radionuclide chelator, such as EOTUBE, DPTA, DOTA, or TETA. Another bispecific antibody of interest binds the protein antigen described herein and further binds tissue factor (TF).

### **Heteroconjugate Antibodies**

Heteroconjugate antibodies are also within the scope of the present invention.

20       Heteroconjugate antibodies are composed of two covalently joined antibodies. Such antibodies have, for example, been proposed to target immune system cells to unwanted cells (U.S. Patent No. 4,676,980), and for treatment of HIV infection (WO 91/00360; WO 92/200373; EP 03089). It is contemplated that the antibodies can be prepared *in vitro* using known methods in synthetic protein chemistry, including those involving crosslinking agents. For example, immunotoxins

25       can be constructed using a disulfide exchange reaction or by forming a thioether bond. Examples of suitable reagents for this purpose include iminothiolate and methyl-4-mercaptobutyrimidate and those disclosed, for example, in U.S. Patent No. 4,676,980.

## Effector Function Engineering

It can be desirable to modify the antibody of the invention with respect to effector function, so as to enhance, *e.g.*, the effectiveness of the antibody in treating cancer. For example, cysteine residue(s) can be introduced into the Fc region, thereby allowing interchain disulfide bond formation in this region. The homodimeric antibody thus generated can have improved internalization capability and/or increased complement-mediated cell killing and antibody-dependent cellular cytotoxicity (ADCC). See Caron et al., *J. Exp Med.*, 176: 1191-1195 (1992) and Shopes, *J. Immunol.*, 148: 2918-2922 (1992). Homodimeric antibodies with enhanced anti-tumor activity can also be prepared using heterobifunctional cross-linkers as described in Wolff et al. *Cancer Research*, 53: 2560-2565 (1993). Alternatively, an antibody can be engineered that has dual Fc regions and can thereby have enhanced complement lysis and ADCC capabilities. See Stevenson et al., *Anti-Cancer Drug Design*, 3: 219-230 (1989).

## Immunoconjugates

The invention also pertains to immunoconjugates comprising an antibody conjugated to a cytotoxic agent such as a chemotherapeutic agent, toxin (*e.g.*, an enzymatically active toxin of bacterial, fungal, plant, or animal origin, or fragments thereof), or a radioactive isotope (*i.e.*, a radioconjugate).

Chemotherapeutic agents useful in the generation of such immunoconjugates have been described above. Enzymatically active toxins and fragments thereof that can be used include diphtheria A chain, nonbinding active fragments of diphtheria toxin, exotoxin A chain (from *Pseudomonas aeruginosa*), ricin A chain, abrin A chain, modeccin A chain, alpha-sarcin, Aleurites fordii proteins, dianthin proteins, Phytolaca americana proteins (PAPI, PAPII, and PAP-S), momordica charantia inhibitor, curcin, croton, saponaria officinalis inhibitor, gelonin, mitogellin, restrictocin, phenomycin, enomycin, and the tricothecenes. A variety of radionuclides are available for the production of radioconjugated antibodies. Examples include  $^{212}\text{Bi}$ ,  $^{131}\text{I}$ ,  $^{131}\text{In}$ ,  $^{90}\text{Y}$ , and  $^{186}\text{Re}$ .

Conjugates of the antibody and cytotoxic agent are made using a variety of bifunctional protein-coupling agents such as N-succinimidyl-3-(2-pyridyldithiol) propionate (SPDP), iminothiolane (IT), bifunctional derivatives of imidoesters (such as dimethyl adipimidate HCL),

active esters (such as disuccinimidyl suberate), aldehydes (such as glutaraldehyde), bis-azido compounds (such as bis (p-azidobenzoyl) hexanediamine), bis-diazonium derivatives (such as bis-(p-diazoniumbenzoyl)-ethylenediamine), diisocyanates (such as tolyene 2,6-diisocyanate), and bis-active fluorine compounds (such as 1,5-difluoro-2,4-dinitrobenzene). For example, a  
5 ricin immunotoxin can be prepared as described in Vitetta et al., Science, 238: 1098 (1987). Carbon-14-labeled 1-isothiocyanatobenzyl-3-methyldiethylene triaminepentaacetic acid (MX-DTPA) is an exemplary chelating agent for conjugation of radionucleotide to the antibody. See WO94/11026.

In another embodiment, the antibody can be conjugated to a "receptor" (such streptavidin)  
10 for utilization in tumor pretargeting wherein the antibody-receptor conjugate is administered to the patient, followed by removal of unbound conjugate from the circulation using a clearing agent and then administration of a "ligand" (*e.g.*, avidin) that is in turn conjugated to a cytotoxic agent.

### 15 **ORX Recombinant Expression Vectors and Host Cells**

Another aspect of the invention pertains to vectors, preferably expression vectors, containing a nucleic acid encoding an ORX protein, or derivatives, fragments, analogs or homologs thereof. As used herein, the term "vector" refers to a nucleic acid molecule capable of transporting another nucleic acid to which it has been linked. One type of vector is a "plasmid",  
20 which refers to a circular double stranded DNA loop into which additional DNA segments can be ligated. Another type of vector is a viral vector, wherein additional DNA segments can be ligated into the viral genome. Certain vectors are capable of autonomous replication in a host cell into which they are introduced (*e.g.*, bacterial vectors having a bacterial origin of replication and episomal mammalian vectors). Other vectors (*e.g.*, non-episomal mammalian vectors) are  
25 integrated into the genome of a host cell upon introduction into the host cell, and thereby are replicated along with the host genome. Moreover, certain vectors are capable of directing the expression of genes to which they are operatively-linked. Such vectors are referred to herein as "expression vectors". In general, expression vectors of utility in recombinant DNA techniques are often in the form of plasmids. In the present specification, "plasmid" and "vector" can be  
30 used interchangeably as the plasmid is the most commonly used form of vector. However, the

invention is intended to include such other forms of expression vectors, such as viral vectors (e.g., replication defective retroviruses, adenoviruses and adeno-associated viruses), which serve equivalent functions.

The recombinant expression vectors of the invention comprise a nucleic acid of the invention in a form suitable for expression of the nucleic acid in a host cell, which means that the recombinant expression vectors include one or more regulatory sequences, selected on the basis of the host cells to be used for expression, that is operatively-linked to the nucleic acid sequence to be expressed. Within a recombinant expression vector, "operably-linked" is intended to mean that the nucleotide sequence of interest is linked to the regulatory sequence(s) in a manner that allows for expression of the nucleotide sequence (e.g., in an *in vitro* transcription/translation system or in a host cell when the vector is introduced into the host cell).

The term "regulatory sequence" is intended to include promoters, enhancers and other expression control elements (e.g., polyadenylation signals). Such regulatory sequences are described, for example, in Goeddel, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990). Regulatory sequences include those that direct constitutive expression of a nucleotide sequence in many types of host cell and those that direct expression of the nucleotide sequence only in certain host cells (e.g., tissue-specific regulatory sequences). It will be appreciated by those skilled in the art that the design of the expression vector can depend on such factors as the choice of the host cell to be transformed, the level of expression of protein desired, etc. The expression vectors of the invention can be introduced into host cells to thereby produce proteins or peptides, including fusion proteins or peptides, encoded by nucleic acids as described herein (e.g., ORX proteins, mutant forms of ORX proteins, fusion proteins, etc.).

The recombinant expression vectors of the invention can be designed for expression of ORX proteins in prokaryotic or eukaryotic cells. For example, ORX proteins can be expressed in bacterial cells such as *Escherichia coli*, insect cells (using baculovirus expression vectors) yeast cells or mammalian cells. Suitable host cells are discussed further in Goeddel, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990). Alternatively, the recombinant expression vector can be transcribed and translated *in vitro*, for example using T7 promoter regulatory sequences and T7 polymerase.

Expression of proteins in prokaryotes is most often carried out in *Escherichia coli* with vectors containing constitutive or inducible promoters directing the expression of either fusion or non-fusion proteins. Fusion vectors add a number of amino acids to a protein encoded therein, usually to the amino terminus of the recombinant protein. Such fusion vectors typically serve three purposes: (i) to increase expression of recombinant protein; (ii) to increase the solubility of the recombinant protein; and (iii) to aid in the purification of the recombinant protein by acting as a ligand in affinity purification. Often, in fusion expression vectors, a proteolytic cleavage site is introduced at the junction of the fusion moiety and the recombinant protein to enable separation of the recombinant protein from the fusion moiety subsequent to purification of the fusion protein. Such enzymes, and their cognate recognition sequences, include Factor Xa, thrombin and enterokinase. Typical fusion expression vectors include pGEX (Pharmacia Biotech Inc; Smith and Johnson, 1988. *Gene* 67: 31-40), pMAL (New England Biolabs, Beverly, Mass.) and pRIT5 (Pharmacia, Piscataway, N.J.) that fuse glutathione S-transferase (GST), maltose E binding protein, or protein A, respectively, to the target recombinant protein.

Examples of suitable inducible non-fusion *E. coli* expression vectors include pTrc (Amrann *et al.*, (1988) *Gene* 69:301-315) and pET 11d (Studier *et al.*, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990) 60-89).

One strategy to maximize recombinant protein expression in *E. coli* is to express the protein in a host bacteria with an impaired capacity to proteolytically cleave the recombinant protein. *See, e.g.*, Gottesman, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990) 119-128. Another strategy is to alter the nucleic acid sequence of the nucleic acid to be inserted into an expression vector so that the individual codons for each amino acid are those preferentially utilized in *E. coli* (*see, e.g.*, Wada, *et al.*, 1992. *Nucl. Acids Res.* 20: 2111-2118). Such alteration of nucleic acid sequences of the invention can be carried out by standard DNA synthesis techniques.

In another embodiment, the ORX expression vector is a yeast expression vector. Examples of vectors for expression in yeast *Saccharomyces cerevisiae* include pYepSec1 (Baldari, *et al.*, 1987. *EMBO J.* 6: 229-234), pMFa (Kurjan and Herskowitz, 1982. *Cell* 30:

933-943), pJRY88 (Schultz *et al.*, 1987. *Gene* 54: 113-123), pYES2 (Invitrogen Corporation, San Diego, Calif.), and picZ (InVitrogen Corp, San Diego, Calif.).

Alternatively, ORX can be expressed in insect cells using baculovirus expression vectors. Baculovirus vectors available for expression of proteins in cultured insect cells (*e.g.*, SF9 cells) include the pAc series (Smith, *et al.*, 1983. *Mol. Cell. Biol.* 3: 2156-2165) and the pVL series (Lucklow and Summers, 1989. *Virology* 170: 31-39).

In yet another embodiment, a nucleic acid of the invention is expressed in mammalian cells using a mammalian expression vector. Examples of mammalian expression vectors include pCDM8 (Seed, 1987. *Nature* 329: 840) and pMT2PC (Kaufman, *et al.*, 1987. *EMBO J.* 6: 187-195). When used in mammalian cells, the expression vector's control functions are often provided by viral regulatory elements. For example, commonly used promoters are derived from polyoma, adenovirus 2, cytomegalovirus, and simian virus 40. For other suitable expression systems for both prokaryotic and eukaryotic cells see, *e.g.*, Chapters 16 and 17 of Sambrook, *et al.*, MOLECULAR CLONING: A LABORATORY MANUAL. 2nd ed., Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y., 1989.

In another embodiment, the recombinant mammalian expression vector is capable of directing expression of the nucleic acid preferentially in a particular cell type (*e.g.*, tissue-specific regulatory elements are used to express the nucleic acid). Tissue-specific regulatory elements are known in the art. Non-limiting examples of suitable tissue-specific promoters include the albumin promoter (liver-specific; Pinkert, *et al.*, 1987. *Genes Dev.* 1: 268-277), lymphoid-specific promoters (Calame and Eaton, 1988. *Adv. Immunol.* 43: 235-275), in particular promoters of T cell receptors (Winoto and Baltimore, 1989. *EMBO J.* 8: 729-733) and immunoglobulins (Banerji, *et al.*, 1983. *Cell* 33: 729-740; Queen and Baltimore, 1983. *Cell* 33: 741-748), neuron-specific promoters (*e.g.*, the neurofilament promoter; Byrne and Ruddle, 1989. *Proc. Natl. Acad. Sci. USA* 86: 5473-5477), pancreas-specific promoters (Edlund, *et al.*, 1985. *Science* 230: 912-916), and mammary gland-specific promoters (*e.g.*, milk whey promoter; U.S. Pat. No. 4,873,316 and European Application Publication No. 264,166). Developmentally-regulated promoters are also encompassed, *e.g.*, the murine hox promoters (Kessel and Gruss, 1990. *Science* 249: 374-379) and the  $\alpha$ -fetoprotein promoter (Campes and Tilghman, 1989. *Genes Dev.* 3: 537-546).

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5 The invention further provides a recombinant expression vector comprising a DNA molecule of the invention cloned into the expression vector in an antisense orientation. That is, the DNA molecule is operatively-linked to a regulatory sequence in a manner that allows for expression (by transcription of the DNA molecule) of an RNA molecule that is antisense to ORX mRNA. Regulatory sequences operatively linked to a nucleic acid cloned in the antisense orientation can be chosen that direct the continuous expression of the antisense RNA molecule in a variety of cell types, for instance viral promoters and/or enhancers, or regulatory sequences can be chosen that direct constitutive, tissue specific or cell type specific expression of antisense RNA. The antisense expression vector can be in the form of a recombinant plasmid, phagemid or attenuated virus in which antisense nucleic acids are produced under the control of a high efficiency regulatory region, the activity of which can be determined by the cell type into which the vector is introduced. For a discussion of the regulation of gene expression using antisense genes *see, e.g.,* Weintraub, *et al.*, "Antisense RNA as a molecular tool for genetic analysis," *Reviews-Trends in Genetics*, Vol. 1(1) 1986.

15 Another aspect of the invention pertains to host cells into which a recombinant expression vector of the invention has been introduced: The terms "host cell" and "recombinant host cell" are used interchangeably herein. It is understood that such terms refer not only to the particular subject cell but also to the progeny or potential progeny of such a cell. Because certain modifications may occur in succeeding generations due to either mutation or environmental influences, such progeny may not, in fact, be identical to the parent cell, but are still included within the scope of the term as used herein.

20 A host cell can be any prokaryotic or eukaryotic cell. For example, ORX protein can be expressed in bacterial cells such as *E. coli*, insect cells, yeast or mammalian cells (such as human, Chinese hamster ovary cells (CHO) or COS cells). Other suitable host cells are known to those skilled in the art.

25 Vector DNA can be introduced into prokaryotic or eukaryotic cells via conventional transformation or transfection techniques. As used herein, the terms "transformation" and "transfection" are intended to refer to a variety of art-recognized techniques for introducing foreign nucleic acid (*e.g.,* DNA) into a host cell, including calcium phosphate or calcium chloride co-precipitation, DEAE-dextran-mediated transfection, lipofection, or electroporation.



Suitable methods for transforming or transfecting host cells can be found in Sambrook, *et al.* (MOLECULAR CLONING: A LABORATORY MANUAL. 2nd ed., Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y., 1989), and other laboratory manuals.

5 For stable transfection of mammalian cells, it is known that, depending upon the expression vector and transfection technique used, only a small fraction of cells may integrate the foreign DNA into their genome. In order to identify and select these integrants, a gene that encodes a selectable marker (*e.g.*, resistance to antibiotics) is generally introduced into the host cells along with the gene of interest. Various selectable markers include those that confer  
10 resistance to drugs, such as G418, hygromycin and methotrexate. Nucleic acid encoding a selectable marker can be introduced into a host cell on the same vector as that encoding ORX or can be introduced on a separate vector. Cells stably transfected with the introduced nucleic acid can be identified by drug selection (*e.g.*, cells that have incorporated the selectable marker gene will survive, while the other cells die).

15 A host cell of the invention, such as a prokaryotic or eukaryotic host cell in culture, can be used to produce (*i.e.*, express) ORX protein. Accordingly, the invention further provides methods for producing ORX protein using the host cells of the invention. In one embodiment, the method comprises culturing the host cell of invention (into which a recombinant expression vector encoding ORX protein has been introduced) in a suitable medium such that ORX protein  
20 is produced. In another embodiment, the method further comprises isolating ORX protein from the medium or the host cell.

### Transgenic ORX Animals

25 The host cells of the invention can also be used to produce non-human transgenic animals. For example, in one embodiment, a host cell of the invention is a fertilized oocyte or an embryonic stem cell into which ORX protein-coding sequences have been introduced. Such host cells can then be used to create non-human transgenic animals in which exogenous ORX sequences have been introduced into their genome or homologous recombinant animals in which endogenous ORX sequences have been altered. Such animals are useful for studying the  
30 function and/or activity of ORX protein and for identifying and/or evaluating modulators of

ORX protein activity. As used herein, a "transgenic animal" is a non-human animal, preferably a mammal, more preferably a rodent such as a rat or mouse, in which one or more of the cells of the animal includes a transgene. Other examples of transgenic animals include non-human primates, sheep, dogs, cows, goats, chickens, amphibians, etc. A transgene is exogenous DNA that is integrated into the genome of a cell from which a transgenic animal develops and that remains in the genome of the mature animal, thereby directing the expression of an encoded gene product in one or more cell types or tissues of the transgenic animal. As used herein, a "homologous recombinant animal" is a non-human animal, preferably a mammal, more preferably a mouse, in which an endogenous ORX gene has been altered by homologous recombination between the endogenous gene and an exogenous DNA molecule introduced into a cell of the animal, *e.g.*, an embryonic cell of the animal, prior to development of the animal.

A transgenic animal of the invention can be created by introducing ORX-encoding nucleic acid into the male pronuclei of a fertilized oocyte (*e.g.*, by microinjection, retroviral infection) and allowing the oocyte to develop in a pseudopregnant female foster animal. Sequences including GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 can be introduced as a transgene into the genome of a non-human animal. Alternatively, a non-human homologue of the human ORX gene, such as a mouse ORX gene, can be isolated based on hybridization to the human ORX cDNA (described further *supra*) and used as a transgene. Intronic sequences and polyadenylation signals can also be included in the transgene to increase the efficiency of expression of the transgene. A tissue-specific regulatory sequence(s) can be operably-linked to the ORX transgene to direct expression of ORX protein to particular cells. Methods for generating transgenic animals via embryo manipulation and microinjection, particularly animals such as mice, have become conventional in the art and are described, for example, in U.S. Patent Nos. 4,736,866; 4,870,009; and 4,873,191; and Hogan, 1986. In: MANIPULATING THE MOUSE EMBRYO, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y. Similar methods are used for production of other transgenic animals. A transgenic founder animal can be identified based upon the presence of the ORX transgene in its genome and/or expression of ORX mRNA in tissues or cells of the animals. A transgenic founder animal can then be used to breed additional animals carrying the

transgene. Moreover, transgenic animals carrying a transgene-encoding ORX protein can further be bred to other transgenic animals carrying other transgenes.

To create a homologous recombinant animal, a vector is prepared which contains at least a portion of an ORX gene into which a deletion, addition or substitution has been introduced to thereby alter, *e.g.*, functionally disrupt, the ORX gene. The ORX gene can be a human gene, but more preferably, is a non-human homologue of a human ORX gene. For example, a mouse homologue of human ORX gene of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, can be used to construct a homologous recombination vector suitable for altering an endogenous ORX gene in the mouse genome. In one embodiment, the vector is designed such that, upon homologous recombination, the endogenous ORX gene is functionally disrupted (*i.e.*, no longer encodes a functional protein; also referred to as a "knock out" vector).

Alternatively, the vector can be designed such that, upon homologous recombination, the endogenous ORX gene is mutated or otherwise altered but still encodes functional protein (*e.g.*, the upstream regulatory region can be altered to thereby alter the expression of the endogenous ORX protein). In the homologous recombination vector, the altered portion of the ORX gene is flanked at its 5'- and 3'-termini by additional nucleic acid of the ORX gene to allow for homologous recombination to occur between the exogenous ORX gene carried by the vector and an endogenous ORX gene in an embryonic stem cell. The additional flanking ORX nucleic acid is of sufficient length for successful homologous recombination with the endogenous gene. Typically, several kilobases of flanking DNA (both at the 5'- and 3'-termini) are included in the vector. *See, e.g.*, Thomas, *et al.*, 1987. *Cell* 51: 503 for a description of homologous recombination vectors. The vector is then introduced into an embryonic stem cell line (*e.g.*, by electroporation) and cells in which the introduced ORX gene has homologously-recombined with the endogenous ORX gene are selected. *See, e.g.*, Li, *et al.*, 1992. *Cell* 69: 915.

The selected cells are then injected into a blastocyst of an animal (*e.g.*, a mouse) to form aggregation chimeras. *See, e.g.*, Bradley, 1987. In: TERATOCARCINOMAS AND EMBRYONIC STEM CELLS: A PRACTICAL APPROACH, Robertson, ed. IRL, Oxford, pp. 113-152. A chimeric embryo can then be implanted into a suitable pseudopregnant female foster animal and the embryo brought to term. Progeny harboring the homologously-recombined DNA in their germ cells can

be used to breed animals in which all cells of the animal contain the homologously-recombined DNA by germline transmission of the transgene. Methods for constructing homologous recombination vectors and homologous recombinant animals are described further in Bradley, 1991. *Curr. Opin. Biotechnol.* 2: 823-829; PCT International Publication Nos.: WO 90/11354; WO 91/01140; WO 92/0968; and WO 93/04169.

In another embodiment, transgenic non-humans animals can be produced that contain selected systems that allow for regulated expression of the transgene. One example of such a system is the cre/loxP recombinase system of bacteriophage P1. For a description of the cre/loxP recombinase system, See, e.g., Lakso, *et al.*, 1992. *Proc. Natl. Acad. Sci. USA* 89: 6232-6236.

Another example of a recombinase system is the FLP recombinase system of *Saccharomyces cerevisiae*. See, O'Gorman, *et al.*, 1991. *Science* 251:1351-1355. If a cre/loxP recombinase system is used to regulate expression of the transgene, animals containing transgenes encoding both the Cre recombinase and a selected protein are required. Such animals can be provided through the construction of "double" transgenic animals, e.g., by mating two transgenic animals, one containing a transgene encoding a selected protein and the other containing a transgene encoding a recombinase.

Clones of the non-human transgenic animals described herein can also be produced according to the methods described in Wilmut, *et al.*, 1997. *Nature* 385: 810-813. In brief, a cell (e.g., a somatic cell) from the transgenic animal can be isolated and induced to exit the growth cycle and enter G<sub>0</sub> phase. The quiescent cell can then be fused, e.g., through the use of electrical pulses, to an enucleated oocyte from an animal of the same species from which the quiescent cell is isolated. The reconstructed oocyte is then cultured such that it develops to morula or blastocyte and then transferred to pseudopregnant female foster animal. The offspring borne of this female foster animal will be a clone of the animal from which the cell (e.g., the somatic cell) is isolated.

### Pharmaceutical Compositions

The ORX nucleic acid molecules, ORX proteins, and anti-ORX antibodies (also referred to herein as "active compounds") of the invention, and derivatives, fragments, analogs and homologs thereof, can be incorporated into pharmaceutical compositions suitable for

administration. Such compositions typically comprise the nucleic acid molecule, protein, or antibody and a pharmaceutically acceptable carrier. As used herein, "pharmaceutically acceptable carrier" is intended to include any and all solvents, dispersion media, coatings, antibacterial and antifungal agents, isotonic and absorption delaying agents, and the like, compatible with pharmaceutical administration. Suitable carriers are described in the most recent edition of Remington's Pharmaceutical Sciences, a standard reference text in the field, which is incorporated herein by reference. Preferred examples of such carriers or diluents include, but are not limited to, water, saline, finger's solutions, dextrose solution, and 5% human serum albumin. Liposomes and non-aqueous vehicles such as fixed oils may also be used. The use of such media and agents for pharmaceutically active substances is well known in the art. Except insofar as any conventional media or agent is incompatible with the active compound, use thereof in the compositions is contemplated. Supplementary active compounds can also be incorporated into the compositions.

The antibodies disclosed herein can also be formulated as immunoliposomes. Liposomes containing the antibody are prepared by methods known in the art, such as described in Epstein et al., Proc. Natl. Acad. Sci. USA, 82: 3688 (1985); Hwang et al., Proc. Natl. Acad. Sci. USA, 77: 4030 (1980); and U.S. Pat. Nos. 4,485,045 and 4,544,545. Liposomes with enhanced circulation time are disclosed in U.S. Patent No. 5,013,556.

Particularly useful liposomes can be generated by the reverse-phase evaporation method with a lipid composition comprising phosphatidylcholine, cholesterol, and PEG-derivatized phosphatidylethanolamine (PEG-PE). Liposomes are extruded through filters of defined pore size to yield liposomes with the desired diameter. Fab' fragments of the antibody of the present invention can be conjugated to the liposomes as described in Martin et al., J. Biol. Chem., 257: 286-288 (1982) via a disulfide-interchange reaction. A chemotherapeutic agent (such as Doxorubicin) is optionally contained within the liposome. See Gabizon et al., J. National Cancer Inst., 81(19): 1484 (1989).

A pharmaceutical composition of the invention is formulated to be compatible with its intended route of administration. Examples of routes of administration include parenteral, *e.g.*, intravenous, intradermal, subcutaneous, oral (*e.g.*, inhalation), transdermal (*i.e.*, topical), transmucosal, and rectal administration. Solutions or suspensions used for parenteral,

intradermal, or subcutaneous application can include the following components: a sterile diluent such as water for injection, saline solution, fixed oils, polyethylene glycols, glycerine, propylene glycol or other synthetic solvents; antibacterial agents such as benzyl alcohol or methyl parabens; antioxidants such as ascorbic acid or sodium bisulfite; chelating agents such as

5 ethylenediaminetetraacetic acid (EDTA); buffers such as acetates, citrates or phosphates, and agents for the adjustment of tonicity such as sodium chloride or dextrose. The pH can be adjusted with acids or bases, such as hydrochloric acid or sodium hydroxide. The parenteral preparation can be enclosed in ampoules, disposable syringes or multiple dose vials made of glass or plastic.

10 Pharmaceutical compositions suitable for injectable use include sterile aqueous solutions (where water soluble) or dispersions and sterile powders for the extemporaneous preparation of sterile injectable solutions or dispersion. For intravenous administration, suitable carriers include physiological saline, bacteriostatic water, Cremophor EL™ (BASF, Parsippany, N.J.) or phosphate buffered saline (PBS). In all cases, the composition must be sterile and should be  
15 fluid to the extent that easy syringeability exists. It must be stable under the conditions of manufacture and storage and must be preserved against the contaminating action of microorganisms such as bacteria and fungi. The carrier can be a solvent or dispersion medium containing, for example, water, ethanol, polyol (for example, glycerol, propylene glycol, and liquid polyethylene glycol, and the like), and suitable mixtures thereof. The proper fluidity can  
20 be maintained, for example, by the use of a coating such as lecithin, by the maintenance of the required particle size in the case of dispersion and by the use of surfactants. Prevention of the action of microorganisms can be achieved by various antibacterial and antifungal agents, for example, parabens, chlorobutanol, phenol, ascorbic acid, thimerosal, and the like. In many cases, it will be preferable to include isotonic agents, for example, sugars, polyalcohols such as manitol, sorbitol, sodium chloride in the composition. Prolonged absorption of the injectable  
25 compositions can be brought about by including in the composition an agent which delays absorption, for example, aluminum monostearate and gelatin.

Sterile injectable solutions can be prepared by incorporating the active compound (*e.g.*, an ORX protein or anti-ORX antibody) in the required amount in an appropriate solvent with one  
30 or a combination of ingredients enumerated above, as required, followed by filtered sterilization.

Generally, dispersions are prepared by incorporating the active compound into a sterile vehicle that contains a basic dispersion medium and the required other ingredients from those enumerated above. In the case of sterile powders for the preparation of sterile injectable solutions, methods of preparation are vacuum drying and freeze-drying that yields a powder of the active ingredient plus any additional desired ingredient from a previously sterile-filtered solution thereof.

Oral compositions generally include an inert diluent or an edible carrier. They can be enclosed in gelatin capsules or compressed into tablets. For the purpose of oral therapeutic administration, the active compound can be incorporated with excipients and used in the form of tablets, troches, or capsules. Oral compositions can also be prepared using a fluid carrier for use as a mouthwash, wherein the compound in the fluid carrier is applied orally and swished and expectorated or swallowed. Pharmaceutically compatible binding agents, and/or adjuvant materials can be included as part of the composition. The tablets, pills, capsules, troches and the like can contain any of the following ingredients, or compounds of a similar nature: a binder such as microcrystalline cellulose, gum tragacanth or gelatin; an excipient such as starch or lactose, a disintegrating agent such as alginic acid, Primogel, or corn starch; a lubricant such as magnesium stearate or Sterotes; a glidant such as colloidal silicon dioxide; a sweetening agent such as sucrose or saccharin; or a flavoring agent such as peppermint, methyl salicylate, or orange flavoring.

For administration by inhalation, the compounds are delivered in the form of an aerosol spray from pressured container or dispenser which contains a suitable propellant, *e.g.*, a gas such as carbon dioxide, or a nebulizer.

Systemic administration can also be by transmucosal or transdermal means. For transmucosal or transdermal administration, penetrants appropriate to the barrier to be permeated are used in the formulation. Such penetrants are generally known in the art, and include, for example, for transmucosal administration, detergents, bile salts, and fusidic acid derivatives. Transmucosal administration can be accomplished through the use of nasal sprays or suppositories. For transdermal administration, the active compounds are formulated into ointments, salves, gels, or creams as generally known in the art.

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The compounds can also be prepared in the form of suppositories (*e.g.*, with conventional suppository bases such as cocoa butter and other glycerides) or retention enemas for rectal delivery.

5 In one embodiment, the active compounds are prepared with carriers that will protect the compound against rapid elimination from the body, such as a controlled release formulation, including implants and microencapsulated delivery systems. Biodegradable, biocompatible polymers can be used, such as ethylene vinyl acetate, polyanhydrides, polyglycolic acid, collagen, polyorthoesters, and polylactic acid. Methods for preparation of such formulations will be apparent to those skilled in the art. The materials can also be obtained commercially from  
10 Alza Corporation and Nova Pharmaceuticals, Inc. Liposomal suspensions (including liposomes targeted to infected cells with monoclonal antibodies to viral antigens) can also be used as pharmaceutically acceptable carriers. These can be prepared according to methods known to those skilled in the art, for example, as described in U.S. Patent No. 4,522,811.

15 It is especially advantageous to formulate oral or parenteral compositions in dosage unit form for ease of administration and uniformity of dosage. Dosage unit form as used herein refers to physically discrete units suited as unitary dosages for the subject to be treated; each unit containing a predetermined quantity of active compound calculated to produce the desired therapeutic effect in association with the required pharmaceutical carrier. The specification for the dosage unit forms of the invention are dictated by and directly dependent on the unique  
20 characteristics of the active compound and the particular therapeutic effect to be achieved, and the limitations inherent in the art of compounding such an active compound for the treatment of individuals.

25 The nucleic acid molecules of the invention can be inserted into vectors and used as gene therapy vectors. Gene therapy vectors can be delivered to a subject by, for example, intravenous injection, local administration (*see, e.g.*, U.S. Patent No. 5,328,470) or by stereotactic injection (*see, e.g.*, Chen, *et al.*, 1994. *Proc. Natl. Acad. Sci. USA* 91: 3054-3057). The pharmaceutical preparation of the gene therapy vector can include the gene therapy vector in an acceptable diluent, or can comprise a slow release matrix in which the gene delivery vehicle is imbedded. Alternatively, where the complete gene delivery vector can be produced intact from recombinant



cells, e.g., retroviral vectors, the pharmaceutical preparation can include one or more cells that produce the gene delivery system.

Antibodies specifically binding a protein of the invention, as well as other molecules identified by the screening assays disclosed herein, can be administered for the treatment of various disorders in the form of pharmaceutical compositions. Principles and considerations involved in preparing such compositions, as well as guidance in the choice of components are provided, for example, in Remington : The Science And Practice Of Pharmacy 19th ed. (Alfonso R. Gennaro, et al., editors) Mack Pub. Co., Easton, Pa.: 1995; Drug Absorption Enhancement : Concepts, Possibilities, Limitations, And Trends, Harwood Academic Publishers, Langhorne, Pa., 1994; and Peptide And Protein Drug Delivery (Advances In Parenteral Sciences, Vol. 4), 1991, M. Dekker, New York. If the antigenic protein is intracellular and whole antibodies are used as inhibitors, internalizing antibodies are preferred. However, liposomes can also be used to deliver the antibody, or an antibody fragment, into cells. Where antibody fragments are used, the smallest inhibitory fragment that specifically binds to the binding domain of the target protein is preferred. For example, based upon the variable-region sequences of an antibody, peptide molecules can be designed that retain the ability to bind the target protein sequence. Such peptides can be synthesized chemically and/or produced by recombinant DNA technology. See, e.g., Marasco *et al.*, 1993 *Proc. Natl. Acad. Sci. USA*, 90: 7889-7893. The formulation herein can also contain more than one active compound as necessary for the particular indication being treated, preferably those with complementary activities that do not adversely affect each other. Alternatively, or in addition, the composition can comprise an agent that enhances its function, such as, for example, a cytotoxic agent, cytokine, chemotherapeutic agent, or growth-inhibitory agent. Such molecules are suitably present in combination in amounts that are effective for the purpose intended. The active ingredients can also be entrapped in microcapsules prepared, for example, by coacervation techniques or by interfacial polymerization, for example, hydroxymethylcellulose or gelatin-microcapsules and poly-(methylmethacrylate) microcapsules, respectively, in colloidal drug delivery systems (for example, liposomes, albumin microspheres, microemulsions, nano-particles, and nanocapsules) or in macroemulsions.

The formulations to be used for *in vivo* administration must be sterile. This is readily accomplished by filtration through sterile filtration membranes.

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Sustained-release preparations can be prepared. Suitable examples of sustained-release preparations include semipermeable matrices of solid hydrophobic polymers containing the antibody, which matrices are in the form of shaped articles, *e.g.*, films, or microcapsules. Examples of sustained-release matrices include polyesters, hydrogels (for example, poly(2-hydroxyethyl-methacrylate), or poly(vinylalcohol)), polylactides (U.S. Pat. No. 3,773,919), copolymers of L-glutamic acid and ethyl-L-glutamate, non-degradable ethylene-vinyl acetate, degradable lactic acid-glycolic acid copolymers such as the LUPRON DEPOT™ (injectable microspheres composed of lactic acid-glycolic acid copolymer and leuprolide acetate), and poly-D-(-)-3-hydroxybutyric acid. While polymers such as ethylene-vinyl acetate and lactic acid-glycolic acid enable release of molecules for over 100 days, certain hydrogels release proteins for shorter time periods.

The pharmaceutical compositions can be included in a container, pack, or dispenser together with instructions for administration.

## Screening and Detection Methods

The isolated nucleic acid molecules of the invention can be used to express ORX protein (*e.g.*, via a recombinant expression vector in a host cell in gene therapy applications), to detect ORX mRNA (*e.g.*, in a biological sample) or a genetic lesion in an ORX gene, and to modulate ORX activity, as described further, below. In addition, the ORX proteins can be used to screen drugs or compounds that modulate the ORX protein activity or expression as well as to treat disorders characterized by insufficient or excessive production of ORX protein or production of ORX protein forms that have decreased or aberrant activity compared to ORX wild-type protein. In addition, the anti-ORX antibodies of the invention can be used to detect and isolate ORX proteins and modulate ORX activity. For example, ORX activity includes growth and differentiation, antibody production, and tumor growth.

The invention further pertains to novel agents identified by the screening assays described herein and uses thereof for treatments as described, *supra*.

### Screening Assays

The invention provides a method (also referred to herein as a "screening assay") for identifying modulators, *i.e.*, candidate or test compounds or agents (*e.g.*, peptides,

peptidomimetics, small molecules or other drugs) that bind to ORX proteins or have a stimulatory or inhibitory effect on, *e.g.*, ORX protein expression or ORX protein activity. The invention also includes compounds identified in the screening assays described herein.

In one embodiment, the invention provides assays for screening candidate or test compounds which bind to or modulate the activity of the membrane-bound form of an ORX protein or polypeptide or biologically-active portion thereof. The test compounds of the invention can be obtained using any of the numerous approaches in combinatorial library methods known in the art, including: biological libraries; spatially addressable parallel solid phase or solution phase libraries; synthetic library methods requiring deconvolution; the "one-bead one-compound" library method; and synthetic library methods using affinity chromatography selection. The biological library approach is limited to peptide libraries, while the other four approaches are applicable to peptide, non-peptide oligomer or small molecule libraries of compounds. *See, e.g.*, Lam, 1997. *Anticancer Drug Design* 12: 145.

A "small molecule" as used herein, is meant to refer to a composition that has a molecular weight of less than about 5 kD and most preferably less than about 4 kD. Small molecules can be, *e.g.*, nucleic acids, peptides, polypeptides, peptidomimetics, carbohydrates, lipids or other organic or inorganic molecules. Libraries of chemical and/or biological mixtures, such as fungal, bacterial, or algal extracts, are known in the art and can be screened with any of the assays of the invention.

Examples of methods for the synthesis of molecular libraries can be found in the art, for example in: DeWitt, *et al.*, 1993. *Proc. Natl. Acad. Sci. U.S.A.* 90: 6909; Erb, *et al.*, 1994. *Proc. Natl. Acad. Sci. U.S.A.* 91: 11422; Zuckermann, *et al.*, 1994. *J. Med. Chem.* 37: 2678; Cho, *et al.*, 1993. *Science* 261: 1303; Carrell, *et al.*, 1994. *Angew. Chem. Int. Ed. Engl.* 33: 2059; Carell, *et al.*, 1994. *Angew. Chem. Int. Ed. Engl.* 33: 2061; and Gallop, *et al.*, 1994. *J. Med. Chem.* 37: 1233.

Libraries of compounds may be presented in solution (*e.g.*, Houghten, 1992. *Biotechniques* 13: 412-421), or on beads (Lam, 1991. *Nature* 354: 82-84), on chips (Fodor, 1993. *Nature* 364: 555-556), bacteria (Ladner, U.S. Patent No. 5,223,409), spores (Ladner, U.S. Patent 5,233,409), plasmids (Cull, *et al.*, 1992. *Proc. Natl. Acad. Sci. USA* 89: 1865-1869) or on phage (Scott and Smith, 1990. *Science* 249: 386-390; Devlin, 1990. *Science* 249: 404-406; Cwirla, *et*

al., 1990. *Proc. Natl. Acad. Sci. U.S.A.* 87: 6378-6382; Felici, 1991. *J. Mol. Biol.* 222: 301-310; Ladner, U.S. Patent No. 5,233,409.).

In one embodiment, an assay is a cell-based assay in which a cell which expresses a membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface is contacted with a test compound and the ability of the test compound to bind to an ORX protein determined. The cell, for example, can be of mammalian origin or a yeast cell.

Determining the ability of the test compound to bind to the ORX protein can be accomplished, for example, by coupling the test compound with a radioisotope or enzymatic label such that binding of the test compound to the ORX protein or biologically-active portion thereof can be determined by detecting the labeled compound in a complex. For example, test compounds can be labeled with  $^{125}\text{I}$ ,  $^{35}\text{S}$ ,  $^{14}\text{C}$ , or  $^3\text{H}$ , either directly or indirectly, and the radioisotope detected by direct counting of radioemission or by scintillation counting. Alternatively, test compounds can be enzymatically-labeled with, for example, horseradish peroxidase, alkaline phosphatase, or luciferase, and the enzymatic label detected by determination of conversion of an appropriate substrate to product. In one embodiment, the assay comprises contacting a cell which expresses a membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface with a known compound which binds ORX to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact with an ORX protein, wherein determining the ability of the test compound to interact with an ORX protein comprises determining the ability of the test compound to preferentially bind to ORX protein or a biologically-active portion thereof as compared to the known compound.

In another embodiment, an assay is a cell-based assay comprising contacting a cell expressing a membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface with a test compound and determining the ability of the test compound to modulate (e.g., stimulate or inhibit) the activity of the ORX protein or biologically-active portion thereof. Determining the ability of the test compound to modulate the activity of ORX or a biologically-active portion thereof can be accomplished, for example, by determining the ability of the ORX protein to bind to or interact with an ORX target molecule. As used herein, a "target molecule" is a molecule with which an ORX protein binds or interacts in nature, for example, a molecule on the surface of a cell which expresses an ORX interacting protein, a molecule on the

surface of a second cell, a molecule in the extracellular milieu, a molecule associated with the internal surface of a cell membrane or a cytoplasmic molecule. An ORX target molecule can be a non-ORX molecule or an ORX protein or polypeptide of the invention. In one embodiment, an ORX target molecule is a component of a signal transduction pathway that facilitates transduction of an extracellular signal (*e.g.* a signal generated by binding of a compound to a membrane-bound ORX molecule) through the cell membrane and into the cell. The target, for example, can be a second intercellular protein that has catalytic activity or a protein that facilitates the association of downstream signaling molecules with ORX.

Determining the ability of the ORX protein to bind to or interact with an ORX target molecule can be accomplished by one of the methods described above for determining direct binding. In one embodiment, determining the ability of the ORX protein to bind to or interact with an ORX target molecule can be accomplished by determining the activity of the target molecule. For example, the activity of the target molecule can be determined by detecting induction of a cellular second messenger of the target (*i.e.* intracellular  $\text{Ca}^{2+}$ , diacylglycerol,  $\text{IP}_3$ , etc.), detecting catalytic/enzymatic activity of the target on an appropriate substrate, detecting the induction of a reporter gene (comprising an ORX-responsive regulatory element operatively linked to a nucleic acid encoding a detectable marker, *e.g.*, luciferase), or detecting a cellular response, for example, cell survival, cellular differentiation, or cell proliferation.

In yet another embodiment, an assay of the invention is a cell-free assay comprising contacting an ORX protein or biologically-active portion thereof with a test compound and determining the ability of the test compound to bind to the ORX protein or biologically-active portion thereof. Binding of the test compound to the ORX protein can be determined either directly or indirectly as described above. In one such embodiment, the assay comprises contacting the ORX protein or biologically-active portion thereof with a known compound which binds ORX to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact with an ORX protein, wherein determining the ability of the test compound to interact with an ORX protein comprises determining the ability of the test compound to preferentially bind to ORX or biologically-active portion thereof as compared to the known compound.

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5 In still another embodiment, an assay is a cell-free assay comprising contacting ORX protein or biologically-active portion thereof with a test compound and determining the ability of the test compound to modulate (*e.g.* stimulate or inhibit) the activity of the ORX protein or biologically-active portion thereof. Determining the ability of the test compound to modulate the activity of ORX can be accomplished, for example, by determining the ability of the ORX protein to bind to an ORX target molecule by one of the methods described above for determining direct binding. In an alternative embodiment, determining the ability of the test compound to modulate the activity of ORX protein can be accomplished by determining the ability of the ORX protein further modulate an ORX target molecule. For example, the catalytic/enzymatic activity of the target molecule on an appropriate substrate can be determined as described above.

15 In yet another embodiment, the cell-free assay comprises contacting the ORX protein or biologically-active portion thereof with a known compound which binds ORX protein to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact with an ORX protein, wherein determining the ability of the test compound to interact with an ORX protein comprises determining the ability of the ORX protein to preferentially bind to or modulate the activity of an ORX target molecule.

20 The cell-free assays of the invention are amenable to use of both the soluble form or the membrane-bound form of ORX protein. In the case of cell-free assays comprising the membrane-bound form of ORX protein, it may be desirable to utilize a solubilizing agent such that the membrane-bound form of ORX protein is maintained in solution. Examples of such solubilizing agents include non-ionic detergents such as n-octylglucoside, n-dodecylglucoside, n-dodecylmaltoside, octanoyl-N-methylglucamide, decanoyl-N-methylglucamide, Triton<sup>®</sup> X-100, Triton<sup>®</sup> X-114, Thesit<sup>®</sup>, Isotridecypoly(ethylene glycol ether)<sub>n</sub>, N-dodecyl--  
25 N,N-dimethyl-3-ammonio-1-propane sulfonate, 3-(3-cholamidopropyl) dimethylamminiol-1-propane sulfonate (CHAPS), or 3-(3-cholamidopropyl)dimethylamminiol-2-hydroxy-1-propane sulfonate (CHAPSO).

30 In more than one embodiment of the above assay methods of the invention, it may be desirable to immobilize either ORX protein or its target molecule to facilitate separation of complexed from uncomplexed forms of one or both of the proteins, as well as to accommodate

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automation of the assay. Binding of a test compound to ORX protein, or interaction of ORX protein with a target molecule in the presence and absence of a candidate compound, can be accomplished in any vessel suitable for containing the reactants. Examples of such vessels include microtiter plates, test tubes, and micro-centrifuge tubes. In one embodiment, a fusion protein can be provided that adds a domain that allows one or both of the proteins to be bound to a matrix. For example, GST-ORX fusion proteins or GST-target fusion proteins can be adsorbed onto glutathione sepharose beads (Sigma Chemical, St. Louis, MO) or glutathione derivatized microtiter plates, that are then combined with the test compound or the test compound and either the non-adsorbed target protein or ORX protein, and the mixture is incubated under conditions conducive to complex formation (*e.g.*, at physiological conditions for salt and pH). Following incubation, the beads or microtiter plate wells are washed to remove any unbound components, the matrix immobilized in the case of beads, complex determined either directly or indirectly, for example, as described, *supra*. Alternatively, the complexes can be dissociated from the matrix, and the level of ORX protein binding or activity determined using standard techniques.

Other techniques for immobilizing proteins on matrices can also be used in the screening assays of the invention. For example, either the ORX protein or its target molecule can be immobilized utilizing conjugation of biotin and streptavidin. Biotinylated ORX protein or target molecules can be prepared from biotin-NHS (N-hydroxy-succinimide) using techniques well-known within the art (*e.g.*, biotinylation kit, Pierce Chemicals, Rockford, Ill.), and immobilized in the wells of streptavidin-coated 96 well plates (Pierce Chemical). Alternatively, antibodies reactive with ORX protein or target molecules, but which do not interfere with binding of the ORX protein to its target molecule, can be derivatized to the wells of the plate, and unbound target or ORX protein trapped in the wells by antibody conjugation. Methods for detecting such complexes, in addition to those described above for the GST-immobilized complexes, include immunodetection of complexes using antibodies reactive with the ORX protein or target molecule, as well as enzyme-linked assays that rely on detecting an enzymatic activity associated with the ORX protein or target molecule.

In another embodiment, modulators of ORX protein expression are identified in a method wherein a cell is contacted with a candidate compound and the expression of ORX mRNA or protein in the cell is determined. The level of expression of ORX mRNA or protein in the

presence of the candidate compound is compared to the level of expression of ORX mRNA or protein in the absence of the candidate compound. The candidate compound can then be identified as a modulator of ORX mRNA or protein expression based upon this comparison. For example, when expression of ORX mRNA or protein is greater (*i.e.*, statistically significantly greater) in the presence of the candidate compound than in its absence, the candidate compound is identified as a stimulator of ORX mRNA or protein expression. Alternatively, when expression of ORX mRNA or protein is less (statistically significantly less) in the presence of the candidate compound than in its absence, the candidate compound is identified as an inhibitor of ORX mRNA or protein expression. The level of ORX mRNA or protein expression in the cells can be determined by methods described herein for detecting ORX mRNA or protein.

In yet another aspect of the invention, the ORX proteins can be used as "bait proteins" in a two-hybrid assay or three hybrid assay (*see, e.g.*, U.S. Patent No. 5,283,317; Zervos, *et al.*, 1993. *Cell* 72: 223-232; Madura, *et al.*, 1993. *J. Biol. Chem.* 268: 12046-12054; Bartel, *et al.*, 1993. *Biotechniques* 14: 920-924; Iwabuchi, *et al.*, 1993. *Oncogene* 8: 1693-1696; and Brent WO 94/10300), to identify other proteins that bind to or interact with ORX ("ORX-binding proteins" or "ORX-bp") and modulate ORX activity. Such ORX-binding proteins are also likely to be involved in the propagation of signals by the ORX proteins as, for example, upstream or downstream elements of the ORX pathway.

The two-hybrid system is based on the modular nature of most transcription factors, which consist of separable DNA-binding and activation domains. Briefly, the assay utilizes two different DNA constructs. In one construct, the gene that codes for ORX is fused to a gene encoding the DNA binding domain of a known transcription factor (*e.g.*, GAL-4). In the other construct, a DNA sequence, from a library of DNA sequences, that encodes an unidentified protein ("prey" or "sample") is fused to a gene that codes for the activation domain of the known transcription factor. If the "bait" and the "prey" proteins are able to interact, *in vivo*, forming an ORX-dependent complex, the DNA-binding and activation domains of the transcription factor are brought into close proximity. This proximity allows transcription of a reporter gene (*e.g.*, LacZ) that is operably linked to a transcriptional regulatory site responsive to the transcription factor. Expression of the reporter gene can be detected and cell colonies containing the



functional transcription factor can be isolated and used to obtain the cloned gene that encodes the protein which interacts with ORX.

The invention further pertains to novel agents identified by the aforementioned screening assays and uses thereof for treatments as described herein.

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### **Detection Assays**

Portions or fragments of the cDNA sequences identified herein (and the corresponding complete gene sequences) can be used in numerous ways as polynucleotide reagents. By way of example, and not of limitation, these sequences can be used to: (i) identify an individual from a minute biological sample (tissue typing); and (ii) aid in forensic identification of a biological sample. Some of these applications are described in the subsections, below.

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#### *Tissue Typing*

The ORX sequences of the invention can be used to identify individuals from minute biological samples. In this technique, an individual's genomic DNA is digested with one or more restriction enzymes, and probed on a Southern blot to yield unique bands for identification. The sequences of the invention are useful as additional DNA markers for RFLP ("restriction fragment length polymorphisms," described in U.S. Patent No. 5,272,057).

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Furthermore, the sequences of the invention can be used to provide an alternative technique that determines the actual base-by-base DNA sequence of selected portions of an individual's genome. Thus, the ORX sequences described herein can be used to prepare two PCR primers from the 5'- and 3'-termini of the sequences. These primers can then be used to amplify an individual's DNA and subsequently sequence it.

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Panels of corresponding DNA sequences from individuals, prepared in this manner, can provide unique individual identifications, as each individual will have a unique set of such DNA sequences due to allelic differences. The sequences of the invention can be used to obtain such identification sequences from individuals and from tissue. The ORX sequences of the invention uniquely represent portions of the human genome. Allelic variation occurs to some degree in the coding regions of these sequences, and to a greater degree in the noncoding regions. It is estimated that allelic variation between individual humans occurs with a frequency of about once

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per each 500 bases. Much of the allelic variation is due to single nucleotide polymorphisms (SNPs), which include restriction fragment length polymorphisms (RFLPs).

Each of the sequences described herein can, to some degree, be used as a standard against which DNA from an individual can be compared for identification purposes. Because greater numbers of polymorphisms occur in the noncoding regions, fewer sequences are necessary to differentiate individuals. The noncoding sequences can comfortably provide positive individual identification with a panel of perhaps 10 to 1,000 primers that each yield a noncoding amplified sequence of 100 bases. If predicted coding sequences are used, a more appropriate number of primers for positive individual identification would be 500-2,000.

### **Predictive Medicine**

The invention also pertains to the field of predictive medicine in which diagnostic assays, prognostic assays, pharmacogenomics, and monitoring clinical trials are used for prognostic (predictive) purposes to thereby treat an individual prophylactically. Accordingly, one aspect of the invention relates to diagnostic assays for determining ORX protein and/or nucleic acid expression as well as ORX activity, in the context of a biological sample (*e.g.*, blood, serum, cells, tissue) to thereby determine whether an individual is afflicted with a disease or disorder, or is at risk of developing a disorder, associated with aberrant ORX expression or activity. Disorders associated with aberrant ORX expression or activity include, for example, neurodegenerative, cell proliferative, angiogenic, hematopoietic, immunological, inflammatory, and tumor-related disorders and/or pathologies.

The invention also provides for prognostic (or predictive) assays for determining whether an individual is at risk of developing a disorder associated with ORX protein, nucleic acid expression or activity. For example, mutations in an ORX gene can be assayed in a biological sample. Such assays can be used for prognostic or predictive purpose to thereby prophylactically treat an individual prior to the onset of a disorder characterized by or associated with ORX protein, nucleic acid expression, or biological activity.

Another aspect of the invention provides methods for determining ORX protein, nucleic acid expression or activity in an individual to thereby select appropriate therapeutic or prophylactic agents for that individual (referred to herein as "pharmacogenomics").

Pharmacogenomics allows for the selection of agents (*e.g.*, drugs) for therapeutic or prophylactic treatment of an individual based on the genotype of the individual (*e.g.*, the genotype of the individual examined to determine the ability of the individual to respond to a particular agent.)

Yet another aspect of the invention pertains to monitoring the influence of agents (*e.g.*, drugs, compounds) on the expression or activity of ORX in clinical trials.

These and other agents are described in further detail in the following sections.

#### *Diagnostic Assays*

An exemplary method for detecting the presence or absence of ORX in a biological sample involves obtaining a biological sample from a test subject and contacting the biological sample with a compound or an agent capable of detecting ORX protein or nucleic acid (*e.g.*, mRNA, genomic DNA) that encodes ORX protein such that the presence of ORX is detected in the biological sample. An agent for detecting ORX mRNA or genomic DNA is a labeled nucleic acid probe capable of hybridizing to ORX mRNA or genomic DNA. The nucleic acid probe can be, for example, a full-length ORX nucleic acid, or a portion thereof, such as an oligonucleotide of at least 15, 30, 50, 100, 250 or 500 nucleotides in length and sufficient to specifically hybridize under stringent conditions to ORX mRNA or genomic DNA. Other suitable probes for use in the diagnostic assays of the invention are described herein.

One agent for detecting ORX protein is an antibody capable of binding to ORX protein, preferably an antibody with a detectable label. Antibodies directed against a protein of the invention may be used in methods known within the art relating to the localization and/or quantitation of the protein (*e.g.*, for use in measuring levels of the protein within appropriate physiological samples, for use in diagnostic methods, for use in imaging the protein, and the like). In a given embodiment, antibodies against the proteins, or derivatives, fragments, analogs or homologs thereof, that contain the antigen binding domain, are utilized as pharmacologically-active compounds.

An antibody specific for a protein of the invention can be used to isolate the protein by standard techniques, such as immunoaffinity chromatography or immunoprecipitation. Such an antibody can facilitate the purification of the natural protein antigen from cells and of recombinantly produced antigen expressed in host cells. Moreover, such an antibody can be used to detect the antigenic protein (*e.g.*, in a cellular lysate or cell supernatant) in order to evaluate

the abundance and pattern of expression of the antigenic protein. Antibodies directed against the protein can be used diagnostically to monitor protein levels in tissue as part of a clinical testing procedure, *e.g.*, to, for example, determine the efficacy of a given treatment regimen. Detection can be facilitated by coupling (*i.e.*, physically linking) the antibody to a detectable substance.

5 Examples of detectable substances include various enzymes, prosthetic groups, fluorescent materials, luminescent materials, bioluminescent materials, and radioactive materials. Examples of suitable enzymes include horseradish peroxidase, alkaline phosphatase,  $\beta$ -galactosidase, or acetylcholinesterase; examples of suitable prosthetic group complexes include streptavidin/biotin and avidin/biotin; examples of suitable fluorescent materials include umbelliferone, fluorescein, 10 fluorescein isothiocyanate, rhodamine, dichlorotriazinylamine fluorescein, dansyl chloride or phycoerythrin; an example of a luminescent material includes luminol; examples of bioluminescent materials include luciferase, luciferin, and aequorin, and examples of suitable radioactive material include  $^{125}\text{I}$ ,  $^{131}\text{I}$ ,  $^{35}\text{S}$  or  $^3\text{H}$ .

Antibodies can be polyclonal, or more preferably, monoclonal. An intact antibody, or a 15 fragment thereof (*e.g.*, Fab or  $\text{F(ab')}_2$ ) can be used. The term "labeled", with regard to the probe or antibody, is intended to encompass direct labeling of the probe or antibody by coupling (*i.e.*, physically linking) a detectable substance to the probe or antibody, as well as indirect labeling of the probe or antibody by reactivity with another reagent that is directly labeled. Examples of indirect labeling include detection of a primary antibody using a fluorescently-labeled secondary 20 antibody and end-labeling of a DNA probe with biotin such that it can be detected with fluorescently-labeled streptavidin. The term "biological sample" is intended to include tissues, cells and biological fluids isolated from a subject, as well as tissues, cells and fluids present within a subject. That is, the detection method of the invention can be used to detect ORX mRNA, protein, or genomic DNA in a biological sample *in vitro* as well as *in vivo*. For example, 25 *in vitro* techniques for detection of ORX mRNA include Northern hybridizations and *in situ* hybridizations. *In vitro* techniques for detection of ORX protein include enzyme linked immunosorbent assays (ELISAs), Western blots, immunoprecipitations, and immunofluorescence. *In vitro* techniques for detection of ORX genomic DNA include Southern hybridizations. Furthermore, *in vivo* techniques for detection of ORX protein include 30 introducing into a subject a labeled anti-ORX antibody. For example, the antibody can be

labeled with a radioactive marker whose presence and location in a subject can be detected by standard imaging techniques.

In one embodiment, the biological sample contains protein molecules from the test subject. Alternatively, the biological sample can contain mRNA molecules from the test subject or genomic DNA molecules from the test subject. A preferred biological sample is a peripheral blood leukocyte sample isolated by conventional means from a subject.

In one embodiment, the methods further involve obtaining a control biological sample from a control subject, contacting the control sample with a compound or agent capable of detecting ORX protein, mRNA, or genomic DNA, such that the presence of ORX protein, mRNA or genomic DNA is detected in the biological sample, and comparing the presence of ORX protein, mRNA or genomic DNA in the control sample with the presence of ORX protein, mRNA or genomic DNA in the test sample.

The invention also encompasses kits for detecting the presence of ORX in a biological sample. For example, the kit can comprise: a labeled compound or agent capable of detecting ORX protein or mRNA in a biological sample; means for determining the amount of ORX in the sample; and means for comparing the amount of ORX in the sample with a standard. The compound or agent can be packaged in a suitable container. The kit can further comprise instructions for using the kit to detect ORX protein or nucleic acid.

#### *Prognostic Assays*

The diagnostic methods described herein can furthermore be utilized to identify subjects having or at risk of developing a disease or disorder associated with aberrant ORX expression or activity. For example, the assays described herein, such as the preceding diagnostic assays or the following assays, can be utilized to identify a subject having or at risk of developing a disorder associated with ORX protein, nucleic acid expression or activity. Such disorders include for example, neurodegenerative, cell proliferative, angiogenic, hematopoietic, immunological, inflammatory, and tumor-related disorders and/or pathologies.

Alternatively, the prognostic assays can be utilized to identify a subject having or at risk for developing a disease or disorder. Thus, the invention provides a method for identifying a disease or disorder associated with aberrant ORX expression or activity in which a test sample is obtained from a subject and ORX protein or nucleic acid (*e.g.*, mRNA, genomic DNA) is

detected, wherein the presence of ORX protein or nucleic acid is diagnostic for a subject having or at risk of developing a disease or disorder associated with aberrant ORX expression or activity. As used herein, a "test sample" refers to a biological sample obtained from a subject of interest. For example, a test sample can be a biological fluid (*e.g.*, serum), cell sample, or tissue.

Furthermore, the prognostic assays described herein can be used to determine whether a subject can be administered an agent (*e.g.*, an agonist, antagonist, peptidomimetic, protein, peptide, nucleic acid, small molecule, or other drug candidate) to treat a disease or disorder associated with aberrant ORX expression or activity. For example, such methods can be used to determine whether a subject can be effectively treated with an agent for a disorder. Thus, the invention provides methods for determining whether a subject can be effectively treated with an agent for a disorder associated with aberrant ORX expression or activity in which a test sample is obtained and ORX protein or nucleic acid is detected (*e.g.*, wherein the presence of ORX protein or nucleic acid is diagnostic for a subject that can be administered the agent to treat a disorder associated with aberrant ORX expression or activity).

The methods of the invention can also be used to detect genetic lesions in an ORX gene, thereby determining if a subject with the lesioned gene is at risk for a disorder characterized by aberrant cell proliferation and/or differentiation. In various embodiments, the methods include detecting, in a sample of cells from the subject, the presence or absence of a genetic lesion characterized by at least one of an alteration affecting the integrity of a gene encoding an ORX-protein, or the misexpression of the ORX gene. For example, such genetic lesions can be detected by ascertaining the existence of at least one of: (i) a deletion of one or more nucleotides from an ORX gene; (ii) an addition of one or more nucleotides to an ORX gene; (iii) a substitution of one or more nucleotides of an ORX gene, (iv) a chromosomal rearrangement of an ORX gene; (v) an alteration in the level of a messenger RNA transcript of an ORX gene, (vi) aberrant modification of an ORX gene, such as of the methylation pattern of the genomic DNA, (vii) the presence of a non-wild-type splicing pattern of a messenger RNA transcript of an ORX gene, (viii) a non-wild-type level of an ORX protein, (ix) allelic loss of an ORX gene, and (x) inappropriate post-translational modification of an ORX protein. As described herein, there are a large number of assay techniques known in the art which can be used for detecting lesions in an

conventional means from a subject. However, any biological sample containing nucleated cells may be used, including, for example, buccal mucosal cells.

In certain embodiments, detection of the lesion involves the use of a probe/primer in a polymerase chain reaction (PCR) (*see, e.g.*, U.S. Patent Nos. 4,683,195 and 4,683,202), such as anchor PCR or RACE PCR, or, alternatively, in a ligation chain reaction (LCR) (*see, e.g.*, Landegran, *et al.*, 1988. *Science* 241: 1077-1080; and Nakazawa, *et al.*, 1994. *Proc. Natl. Acad. Sci. USA* 91: 360-364), the latter of which can be particularly useful for detecting point mutations in the ORX-gene (*see*, Abravaya, *et al.*, 1995. *Nucl. Acids Res.* 23: 675-682). This method can include the steps of collecting a sample of cells from a patient, isolating nucleic acid (*e.g.*, genomic, mRNA or both) from the cells of the sample, contacting the nucleic acid sample with one or more primers that specifically hybridize to an ORX gene under conditions such that hybridization and amplification of the ORX gene (if present) occurs, and detecting the presence or absence of an amplification product, or detecting the size of the amplification product and comparing the length to a control sample. It is anticipated that PCR and/or LCR may be desirable to use as a preliminary amplification step in conjunction with any of the techniques used for detecting mutations described herein.

Alternative amplification methods include: self sustained sequence replication (*see*, Guatelli, *et al.*, 1990. *Proc. Natl. Acad. Sci. USA* 87: 1874-1878), transcriptional amplification system (*see*, Kwoh, *et al.*, 1989. *Proc. Natl. Acad. Sci. USA* 86: 1173-1177); Q $\beta$  Replicase (*see*, Lizardi, *et al.*, 1988. *BioTechnology* 6: 1197), or any other nucleic acid amplification method, followed by the detection of the amplified molecules using techniques well known to those of skill in the art. These detection schemes are especially useful for the detection of nucleic acid molecules if such molecules are present in very low numbers.

In an alternative embodiment, mutations in an ORX gene from a sample cell can be identified by alterations in restriction enzyme cleavage patterns. For example, sample and control DNA is isolated, amplified (optionally), digested with one or more restriction endonucleases, and fragment length sizes are determined by gel electrophoresis and compared. Differences in fragment length sizes between sample and control DNA indicates mutations in the

5,493,531) can be used to score for the presence of specific mutations by development or loss of a ribozyme cleavage site.

In other embodiments, genetic mutations in ORX can be identified by hybridizing a sample and control nucleic acids, e.g., DNA or RNA, to high-density arrays containing hundreds or thousands of oligonucleotide probes. See, e.g., Cronin, *et al.*, 1996. *Human Mutation* 7: 244-255; Kozal, *et al.*, 1996. *Nat. Med.* 2: 753-759. For example, genetic mutations in ORX can be identified in two dimensional arrays containing light-generated DNA probes as described in Cronin, *et al.*, *supra*. Briefly, a first hybridization array of probes can be used to scan through long stretches of DNA in a sample and control to identify base changes between the sequences by making linear arrays of sequential overlapping probes. This step allows the identification of point mutations. This is followed by a second hybridization array that allows the characterization of specific mutations by using smaller, specialized probe arrays complementary to all variants or mutations detected. Each mutation array is composed of parallel probe sets, one complementary to the wild-type gene and the other complementary to the mutant gene.

In yet another embodiment, any of a variety of sequencing reactions known in the art can be used to directly sequence the ORX gene and detect mutations by comparing the sequence of the sample ORX with the corresponding wild-type (control) sequence. Examples of sequencing reactions include those based on techniques developed by Maxim and Gilbert, 1977. *Proc. Natl. Acad. Sci. USA* 74: 560 or Sanger, 1977. *Proc. Natl. Acad. Sci. USA* 74: 5463. It is also contemplated that any of a variety of automated sequencing procedures can be utilized when performing the diagnostic assays (see, e.g., Naeve, *et al.*, 1995. *Biotechniques* 19: 448), including sequencing by mass spectrometry (see, e.g., PCT International Publication No. WO 94/16101; Cohen, *et al.*, 1996. *Adv. Chromatography* 36: 127-162; and Griffin, *et al.*, 1993. *Appl. Biochem. Biotechnol.* 38: 147-159).

Other methods for detecting mutations in the ORX gene include methods in which protection from cleavage agents is used to detect mismatched bases in RNA/RNA or RNA/DNA heteroduplexes. See, e.g., Myers, *et al.*, 1985. *Science* 230: 1242. In general, the art technique of "mismatch cleavage" starts by providing heteroduplexes of formed by hybridizing (labeled) RNA or DNA containing the wild-type ORX sequence with potentially mutant RNA or DNA obtained from a tissue sample. The double stranded duplexes are treated with an agent that cleaves



single-stranded regions of the duplex such as which will exist due to basepair mismatches between the control and sample strands. For instance, RNA/DNA duplexes can be treated with RNase and DNA/DNA hybrids treated with S<sub>1</sub> nuclease to enzymatically digesting the mismatched regions. In other embodiments, either DNA/DNA or RNA/DNA duplexes can be treated with hydroxylamine or osmium tetroxide and with piperidine in order to digest mismatched regions. After digestion of the mismatched regions, the resulting material is then separated by size on denaturing polyacrylamide gels to determine the site of mutation. See, e.g., Cotton, *et al.*, 1988. *Proc. Natl. Acad. Sci. USA* 85: 4397; Saleeba, *et al.*, 1992. *Methods Enzymol.* 217: 286-295. In an embodiment, the control DNA or RNA can be labeled for detection.

In still another embodiment, the mismatch cleavage reaction employs one or more proteins that recognize mismatched base pairs in double-stranded DNA (so called "DNA mismatch repair" enzymes) in defined systems for detecting and mapping point mutations in ORX cDNAs obtained from samples of cells. For example, the mutY enzyme of *E. coli* cleaves A at G/A mismatches and the thymidine DNA glycosylase from HeLa cells cleaves T at G/T mismatches. See, e.g., Hsu, *et al.*, 1994. *Carcinogenesis* 15: 1657-1662. According to an exemplary embodiment, a probe based on an ORX sequence, e.g., a wild-type ORX sequence, is hybridized to a cDNA or other DNA product from a test cell(s). The duplex is treated with a DNA mismatch repair enzyme, and the cleavage products, if any, can be detected from electrophoresis protocols or the like. See, e.g., U.S. Patent No. 5,459,039.

In other embodiments, alterations in electrophoretic mobility will be used to identify mutations in ORX genes. For example, single strand conformation polymorphism (SSCP) may be used to detect differences in electrophoretic mobility between mutant and wild type nucleic acids. See, e.g., Orita, *et al.*, 1989. *Proc. Natl. Acad. Sci. USA*: 86: 2766; Cotton, 1993. *Mutat. Res.* 285: 125-144; Hayashi, 1992. *Genet. Anal. Tech. Appl.* 9: 73-79. Single-stranded DNA fragments of sample and control ORX nucleic acids will be denatured and allowed to renature. The secondary structure of single-stranded nucleic acids varies according to sequence, the resulting alteration in electrophoretic mobility enables the detection of even a single base change. The DNA fragments may be labeled or detected with labeled probes. The sensitivity of the assay

sensitive to a change in sequence. In one embodiment, the subject method utilizes heteroduplex analysis to separate double stranded heteroduplex molecules on the basis of changes in electrophoretic mobility. See, e.g., Keen, et al., 1991. *Trends Genet.* 7: 5.

In yet another embodiment, the movement of mutant or wild-type fragments in polyacrylamide gels containing a gradient of denaturant is assayed using denaturing gradient gel electrophoresis (DGGE). See, e.g., Myers, et al., 1985. *Nature* 313: 495. When DGGE is used as the method of analysis, DNA will be modified to insure that it does not completely denature, for example by adding a GC clamp of approximately 40 bp of high-melting GC-rich DNA by PCR. In a further embodiment, a temperature gradient is used in place of a denaturing gradient to identify differences in the mobility of control and sample DNA. See, e.g., Rosenbaum and Reissner, 1987. *Biophys. Chem.* 265: 12753.

Examples of other techniques for detecting point mutations include, but are not limited to, selective oligonucleotide hybridization, selective amplification, or selective primer extension. For example, oligonucleotide primers may be prepared in which the known mutation is placed centrally and then hybridized to target DNA under conditions that permit hybridization only if a perfect match is found. See, e.g., Saiki, et al., 1986. *Nature* 324: 163; Saiki, et al., 1989. *Proc. Natl. Acad. Sci. USA* 86: 6230. Such allele specific oligonucleotides are hybridized to PCR amplified target DNA or a number of different mutations when the oligonucleotides are attached to the hybridizing membrane and hybridized with labeled target DNA.

Alternatively, allele specific amplification technology that depends on selective PCR amplification may be used in conjunction with the instant invention. Oligonucleotides used as primers for specific amplification may carry the mutation of interest in the center of the molecule (so that amplification depends on differential hybridization; see, e.g., Gibbs, et al., 1989. *Nucl. Acids Res.* 17: 2437-2448) or at the extreme 3'-terminus of one primer where, under appropriate conditions, mismatch can prevent, or reduce polymerase extension (see, e.g., Prossner, 1993. *Tibtech.* 11: 238). In addition it may be desirable to introduce a novel restriction site in the region of the mutation to create cleavage-based detection. See, e.g., Gasparini, et al., 1992. *Mol. Cell Probes* 6: 1. It is anticipated that in certain embodiments amplification may also be performed using *Taq* ligase for amplification. See, e.g., Barany, 1991. *Proc. Natl. Acad. Sci. USA* 88: 189. In such cases, ligation will occur only if there is a perfect match at the 3'-terminus

of the 5' sequence, making it possible to detect the presence of a known mutation at a specific site by looking for the presence or absence of amplification.

The methods described herein may be performed, for example, by utilizing pre-packaged diagnostic kits comprising at least one probe nucleic acid or antibody reagent described herein, which may be conveniently used, *e.g.*, in clinical settings to diagnose patients exhibiting symptoms or family history of a disease or illness involving an ORX gene.

Furthermore, any cell type or tissue, preferably peripheral blood leukocytes, in which ORX is expressed may be utilized in the prognostic assays described herein. However, any biological sample containing nucleated cells may be used, including, for example, buccal mucosal cells.

The invention will be further described in the following examples, which do not limit the scope of the invention described in the claims.

**EXAMPLE 1: Cloning and analysis of ORX-like sequences in primates and mouse.**

The isolation of ORX-related sequences has been described in Rouquier et al., *Nature Genet.* (1998) 18, 243-50 and Rouquier et al. (1998) *Hum. Mol. Genet.* 7, 1337-1345. Briefly, 100 ng of genomic DNA from each species was subjected to PCR using consensus ORX primers OR5B-OR3B (OR5B (TM2), 5'-CCCATGTA(T/C)TT(G/C/T)TT(C/T)CTC(A/G/T)(G/C)(C/T)AA(C/T)(T/C)T(G/A)TC-3' ; PMY(F/L)FL(S/A/T/G/C)NLS ; OR3B (TM7), (SEQ ID NO: 432) 5'-AG(A/G)C(A/T)(A/G)TAIATGAAIGG(A/G)TTCAICAT-3' (SEQ ID NO:433) ; M(L/F/V/I)NPF(I/M)Y(S/C)L) (SEQ ID NO:434). See Ben-Arie et al., (1994) *Hum. Molec. Genet.* 3, 229-35. A second pair of consensus primers, OR3.1-OR7.1 (OR3.1 (TM3), 5'-GCIATGGCITA(C/T)GA(C/T)(A/C)GITA-3' (SEQ ID NO:435) ; AMAYD(S/R)Y (SEQ ID NO:436) ; OR7.1 (TM7), 5'-A(A/G)I(G/C)(A/T)(A/G)TA(A/G/T)AT(A/G)AAIGG(A/G)TT-3' (SEQ ID NO:437); NPFYIY(S/R/T/C/W)(L/F)(SEQ ID NO:438), was also used to amplify primate ORX sequences. See Freitag et al. (1998) *J. Comp. Physiol.* 183, 635-50 and Freitag et

PCR products were subcloned in the TA vector (InVitrogen), and recombinant clones were identified by PCR. Sequencing of the ORX sequences was performed and sequences were assembled and analyzed. The following species were studied: human (*Homo sapiens*, HSA), chimpanzee (*Pan troglodytes*, PTR), gorilla (*Gorilla gorilla*, GGO), orangutan (*Pongo pygmaeus*, PPY), gibbon (*Hylobates lar*, HLA), macaque (*Macaca sylvanus*, MSY), baboon (*Papio papio*, PPA), marmoset (*Callithrix jacchus*, CJA), squirrel-monkey (*Saimiri sciureus*, SSC, and *Saimiri boliviensis*, SBO), lemur (*Eulemur fulvus*, EFU, and *Eulemur rubriventer*, ERU), and mouse (*Mus musculus domesticus*, MMU). In addition, a few zebrafish (*Danio rerio*, DRE) sequences were also characterized using primers OR3.1-OR7.1.

Pairwise sequence comparisons and multiple alignments were performed using Gap and PileUp from the GCG package (Wisconsin Package version 8).

#### **EXAMPLE 2: Construction and screening of an ORX-specific mouse sublibrary.**

Mouse ORX clones obtained by PCR as described above were gridded in 96-well microtiter dishes (1536 clones in 8 plates). For hybridization screening, the clones were robot-spotted in duplicate on high-density filters as described in Rouquier et al. (1999) *Mamm. Genome* 10, 1172-75.. Approximately 90% of the clones were identified as ORX genes. This library was screened to identify clones hybridizing to human ORX pseudogene sequences. Human plasmid DNA probes were radiolabeled to a specific activity of 108-109 cpm/ $\mu$ g by random hexamer priming using ( -32P)-dCTP (Amersham) as described in Feinberg et al. (1983) *Anal. Biochem.* 132, 6-13. Filter hybridizations were carried out under standard hybridization conditions, and exposed to Kodak X-ray film at -80°C. See Rouquier et al., (1993) *Genomics* 17, 330-40.

Three human ORX probes were used: OR1-72, OR912-47, OR15-71 (DDBJ/GenBank

### EXAMPLE 3:        Sequence analysis of mouse ORX sequences.

To test whether mammals thought to be microsmatic or macrosmatic differ in the fraction of pseudogenes in their ORX repertoire, the ORX sequences in the mouse genome were surveyed. A mouse sublibrary enriched for ORX-related sequences amplified by PCR from the mouse genome was constructed, and nineteen randomly selected mouse ORX clones were sequenced. All 19 have an uninterrupted open-reading frame (ORF) and are potentially functional. These sequences group primarily in family 1 and vary from ~52 to >99% NSI. In addition, in an attempt to bias in favor of selecting mouse ORX pseudogenes, a search for mouse ORX sequences homologous to human pseudogenes was performed. One member was chosen from three different ORX pseudogene families: clones 1-72, 15-71 and 912-47 from chromosomes 1, 15 and 11, respectively. *See Rouquier et al., (1998) Nature Genet. 18, 243-50.* Each of these genes belongs to one of the 3 main groups of human ORX sequences and has accumulated a number of mutations such as stop codons and indel frameshifts. *See id.* The amino-acid sequence identity between these three ranges from 31% to 41%.

High density filters from the mouse ORX sublibrary were then hybridized separately with the three human pseudogene probes at a high stringency. Fourteen clones were sequenced on both strands. These sequences showed 38% to 53% ASI to the human sequences used to select them, indicating that they are not the orthologs of the human pseudogenes. All have an uninterrupted ORF from TM2 to TM7. Together, 33 mouse ORX sequences were sequenced, none of which contained characteristic features of pseudogenes.

### OTHER EMBODIMENTS

While the invention has been described in conjunction with the detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention, which is defined by the scope of the appended claims. Other aspects, advantages, and modifications are within the scope of the following claims.